NOVEMBER 1984

£1.25p

AERO MODELLER

MAP
MODEL PUBLICATION

Mini-Minx 24 inch span
Make it from one sheet of wood

Engine Test
PAW 100

Make your own Jump Jet:
Harrier control liner for beginners
Full-size plans worth £1.00

As seen in the national press
WIN a DREAM HOLIDAY in our GREAT COMPETITION

EVER READY NATIONAL CHAMPIONSHIPS
Control Line and Scale

MICHAEL'S MODELS

646-648 HIGH ROAD, N. FINCHLEY, LONDON, N12 0NL.

OPEN 6 DAYS A WEEK Mon-Fri 9-00 a.m. to 6.00 p.m. Sat 9.00—5.30

MAIL ORDER HOTLINE 01-445-6531

INSTANT CREDIT UP TO £240

ALL MAIL ORDERS WILL BE DESPATCHED SAME DAY SUBJECT TO STOCK AVAILABILITY

JUST RECEIVED

Replica Elfin 1.8cc Diesel	£41.95
Replica Elfin 2.49cc Diesel	£41.95
Replica Orwick 73 Spark complete with coil and condenser	£143.75
Replica Mechanair 5.9cc complete with 10mm spark plug	£82.80
Replica Viking 5.3cc Spark	£80.50
Replica Valkyrie 5.3cc Diesel	£75.90
Replica Orwick 64 Spark complete with coil and condenser	£120.75
2.4 Volt Miniature Ignition Coil	£10.95
⅜" x 24 TPI Spark Plug	£2.95
¼ x 32 TPI Spark Plug	£5.80
Made up H.T. Lead	£1.50
NEW KLG ¼ x 32 TPI Spark Plug	£5.20

ENGINES

DC Dart .5cc	£13.30
Merlin .75cc	£12.20
Spitfire 1cc	£13.60
Sabre 1.5cc	£13.99
Rapier 2.5cc R/C	£34.55
Wasp .8cc	£9.67
Bee .8cc	£12.21
ED Std. Racer 2.46	£17.25
ED Std. Racer 2.46 R/C	£18.75
ED Super Racer 2.46	£19.75
ED Super Racer 2.46 R/C	£21.25
ED Super Hunter 3.46 R/C	£32.25
ED Viking Mkll 4.9cc R/C	£31.25
PAW .8cc	£13.25
PAW .8cc R/C	£19.55
PAW 1.49 DS2	£14.95
PAW 1.49 R/C	£21.85
PAW 1.49 Contest 2	£17.25
NEW PAW 2.49 DS 3	£14.95
PAW 2.49R/C	£22.95
NEW PAW 2.49 Contest	£19.55
PAW 19 DS	£16.70
PAW 19 R/C	£24.15
PAW 29 Std.	£33.95
PAW 20 R/C	£35.95
PAW 35 Std.	£37.95
PAW 35 R/C	£40.25
PAW 1.49 Std. Glow	£17.85
PAW ICC STD	£14.35
PAW ICC R/C	£20.75
PAW 2.49 Std. Glow	£17.25
MVVS 2.5 R/E Glow	£39.95
MVV 2.5 R/E R/V Glow	£39.95
MVVS 2.5 R/E F/I Diesel	£39.95
MVVS 2.5 R/E R/V Diesel	£39.95
NEW **MVVS 6.5 F/I S/E Glow**	£45.00
Pares 2.5 F/I S/E T.R. Diesel	£43.00
KMD 2.5 R/V S/E T.R. Diesel	£43.00
Replica Engines Taplin Tempest 3.2cc	£36.99
Replica Engines Mills 1.3 Mk1	£42.95
MK 17 1.5 Diesel (Russian)	£9.95

VINTAGE KITS

1937 Buccaneer Std 66"	£32.50
6ft Trenton Terror	£32.50
1961 Super 60 63"	£32.95
1937 Quaker Flash 67"	£31.50
1936 Red Zephyr 72"	£39.50
1946 Junior 60 63"	£32.50
1942 Fokker D8 57"	£32.95
1937 Flying Quaker 88"	£42.50
SHG Simplex 60	£28.95
1938 Playboy Snr. 80"	£32.50
SHG Powerhouse 88"	£41.95
SHG Scram 88"	£38.95
Hepcat 48"	£17.50
Super Scorpion 66"	£39.58
Majestic Major 88	£49.50
Flair Junior 60	£31.95

CIPOLLA ENGINES

Junior 1.5 Glow Std	£15.60
Junior 1.5 Diesel Std	£18.95
Junior Comp PF7 1.5 Diesel	£19.75
Master 2.5 FAI Std Glow	£33.50
Master 2.5 Combat	£34.95
Master 4cc Std ABC	£34.95

INDIAN MILLS ENGINES are back in production and both the .75 and 1.3 versions are in stock. Prices are not known at the time of printing so please ring for details.

All prices are correct at the time of going to press 20/9/84 but we reserve the right to supply goods at the price ruling at the time of dispatch.

POSTAGE
Kits £2.00. Engines 75p. All other items 10% 50p minimum 2.00 maximum.

EMCO UNIMAT 1

THE NEW MINIATURE MACHINE TOOL

Mill Capacities
Travel of Slides
Longitudinal 50mm
Cross 30mm

Machine Vice Capacities
35 × 25mm

The basic machine comes complete as illustrated for operation as a lathe, milling and drilling machine, and includes:
3 Jaw Lathe Chuck; Turning Tool; Lathe Centres; Collet Holder and Collets; Machine Vice; Milling Cutter; Fine Feed; Drilling Arm; Fully Motorised; Safe 6v Motor; Raw Materials and Instruction Book.

Lathe Capacities:

Distance Between Centres	135mm
Max Swing Over Bed	50mm
Hole Through Spindle	8mm

ALL FOR ONLY

£69 Inc V.A.T.

SUITABLE FOR NON FERROUS METALS, PLASTICS & WOOD

POWERFUL EMCO 15 WATT TRANSFORMER £18.40 Inc. V.A.T.

Available from leading model shops
Sole U.K. Distributors Trade Enquiries Welcome

SOLENT TOOLS LTD 267 London Road, Portsmouth, Hants. Tel: 0705-667652 3

AERO MODELLER

November 1984

Volume 49
Issue No. 586

Contents

Publisher
Tony Dowdeswell
Editor
Peter Freebrey
Group Editor
Bill Burkinshaw
Art Editor
Nick Howell
Graphics
Jenny Hine
Advertisement Manager
Andrew James
Publishing Director
John Foster
Chairman and Chief Executive
Jim Connell

Cover:
The amazing "Harrier" or AV8B/GR5 to use the official jargon, shown here in US Marines colour scheme. Why not try these colours if you build the profile trainer for control line which is the subject for our pull-out plans feature for this month. (Photograph from British Aerospace) Inset — only a single sheet of balsa required for "Mini-Minx", Vic Smeed's sports rubber power model, sure looks simple, and fun too!

Subscriptions:
Annual UK subscriptions, £17.50. Overseas £19.00 or $25.00. Send remittance to Model & Allied Publications, Subscription Department, P.O. Box 35, Wolsey House, Wolsey Road, Hemel Hempstead, HP2 4SS. (subscription enquiries Tel 0442 (51740). Change of address: US Postmaster: send address changes to Model & Allied Publications, PO Box 35, Wolsey House, Wolsey Road, Hemel Hempstead, Herts HP2 4SS. United Kingdom. U.S.A. subscription agent Joseph J. Delledu, 4314 West 238th Street, Torrence, CA90505.

Aeromodeller Magazine (ISSN 0001-9232) is published monthly by Model & Allied Publications P.O. Box 35, Wolsey House, Wolsey Road, Hemel Hempstead HP2 4SS, England. Tel: Hemel Hempstead (0442) 41221. Second class postage paid in the U.S. at New York, NY. USA Mailing Agent: Eastern News Distributors Inc. 111 Eighth Avenue, New York, N.Y. 10011. **Distribution** to North American hobby and craft stores, museums and bookshops by Bill Dean Books, Ltd., 166-41 Powells Cove Blvd., Post Office Box 69, Whitestone, NY 11357, USA. Tel: 1-212-767 6632. **Distribution** to news stand sales by Eastern News Distribution Inc., 111 Eighth Avenue, New York, N.Y., 1011 U.S.A. Tel: 1-212-255 5620.

Change of address, US Postmaster: Send address changes to Model & Allied Publications, P.O. Box 35, Wolsey House, Wolsey Road, Hemel Hempstead, Hertfordshire HP2 4SS, United Kingdom.

AEROMODELLER incorporates the MODEL AEROPLANE CONSTRUCTOR and is published on the third Friday of each month prior to date of publication.

MAP **Model & Allied Publications**
A DIVISION OF ARGUS SPECIALIST PUBLICATIONS LTD.
P.O. BOX 35, WOLSEY HOUSE, WOLSEY ROAD, HEMEL HEMPSTEAD, HERTS. HP2 4SS

Also publishers of:
RADIO MODELLER — RADIO CONTROL MODEL & ELECTRONICS — POPULAR CRAFTS — SCALE MODELS — MODEL ENGINEER — MODEL BOATS — MODEL RAILWAYS — WOODWORKER — MILITARY MODELLING — MODEL CARS — MOVIE MAKER — PHOTOGRAPHY — CLOCKS — NEW VOYAGER

ABC
MEMBER OF THE AUDIT BUREAU OF CIRCULATIONS

Aeromodeller is printed in Great Britain by Loxley Brothers Ltd., Hazlewood Rd, Sheffield, S8 0YS. Mono origination by Ebony Typesetting, Liskeard, Cornwall for the Proprietors and Publishers, Model & Allied Publications (a member of the Argus Press Group). Trade Sales by Argus Press Sales & Distribution Limited, 12/18 Paul Street, London EC2 4JS.

Have fun with a Hyper Cub

The 30" Wingspan 'HYPER CUB' has been designed for rubber powered operation using the unique D.P.R. Models 'HYPER DRIVE PROPULSION SYSTEM' included with the kit, CO_2 operation using the Telco Turbo Tank 6000 Motor, or may be converted to Radio Control by the experienced modeller using lightweight R/C equipment and Cox .020 cu.in. engine or similar. Available from your local model stockist now Rec. Retail Price £11.95. Gearbox pack also available separately £3.95. Further details from **D.P.R. Models, Unit 9, The Vanguards, Vanguard Way, Shoeburyness, Essex SS3 9QY. Telephone: (03708) 5110.**

DPR MODELS **HIGH PERFORMANCE MODELS EASY TO BUILD AND FLY**

---

look! low prices

DIESEL and GLOPLUG ENGINES

PK-F80	£11.30
DC Sabre	£12.17
DC Spitfire	£11.82
OS40 FS	£68.00
Irvine 20 R/C	£30.50
OS60 FS	£105.00
Merco 61 R/C	£38.52
P.A.W. 1.49 DS	£13.00
P.A.W. 19 DS	£14.50
P.A.W. 2.49	£13.00
HB 61 R/C P.D.P.	£77.34
OS15 R/C	£20.30
Fox 25 R/C	£22.45
Fox 36 C-Special	£32.13
Irvine 61 R/C	54.34

THE MODEL SHOP (Guernsey) No. 1 Commerical Arcade, Guernsey, C.I.

Many more Aero and Marine. New Zealand orders welcome. Send 50p P.O. for lists. Duty free — Export only. Duty & VAT liable UK customers.

NAV-LITE *Made in the U.K.*

IDEAL FOR FIXED WING OR HELICOPTER!

ANTI COLLISION STROBE LIGHTING

NEW! **NL-2022B (70" wing span)** — A complete new six lamp lighting system for both fixed wing or helicopter. This super new electronic circuit controls two static navigational lamps, red, green, two high bright Strobe lamps and two red anti-collision beacons. (Strobes and anti-collision beacon are in anti-phase sequence). The printed circuit board is fitted with screw block connectors and 9 volt PP3 battery clip, as standard. ONLY **£14.95** (incl.)

NL-1011B (70" wing span) — This is our general purpose four lamp system comprising of two high bright Strobe lamps and two red anti-collision beacons both in anti-phase sequence. The miniature P.C.B. is fitted with screw block connector and 9 volt PP3 clip as standard. ONLY **£12.95** inc.

* 25,000 hour lamp life * Low Power consumption
* Auto-lamp switch sequences * Fully guaranteed

LIGHT UP YOUR MODEL TO-DAY!!

Available from most good model shops.

ELECTRONIC MICRO-SYSTEMS, (NAV-LITE SALES DEPT), Unit 1 Fryers Works, Abercromby Avenue, High Wycombe, Bucks. HP12 3BW. Tel: (0494) 443461

Note: All cheques made payable to Electronic Micro Systems. Please allow [illegible] delivery. All products are guaranteed for 6 months.

THE SHARPEST NAME IN CRAFT TOOLS

Swann-Morton

C10 CRAFT BLADES

Obtainable from most Graphic Art supply shops

Super Tigre Bargains . . .

The quality product at a sensible price

ENGINES

X21 Club 20 W/M	£39.95	X25 ABC Fl R C	£44.95
X21 Fl R/C W/M	£45.95	X40 ABC Fl R/C	£49.50
G2146 Stunt	£34.45	X45 ABC Fl R C	£51.50
G2146 R C W M	£42.45	X61 TST RE Fl R C	£77.45
S4S Ring Fl R C W M	£49.95	S61 Ring Fl R C W M	£63.25
S40 ABC Fl R C W M	£55.95	S61 ABC Fl R C	£72.40
S45 Ring Fl R C W M	£51.95	S75 Ring Fl R C W M	£67.50
S45 ABC Fl R C W M	£59.95	S2000 Fl R C	£83.50
ST60 Stunt W M	£53.45	S2000-25 Fl R C	£104.75
ST60 Ring Fl R C W M	£56.45	S21 RE Car	£42.95
X11 Fl R C W M	£23.62	X40 RE RI Speed	£50.50

Fl Front Induction
RI Rear Induction
W M With Silencer
SE Side Exhaust
RE Rear Exhaust
TS Transfers Schnuerle Port
TST Transfer Super Tigre Port
ABC Chromed Brass Sleeve

All engines post paid from Watford. Full spare parts stock available when needed.

TIGRE ENGINES, Unit 10, Paramount Estate, Sandown Road, Watford, Herts. WD2 4NV. Tel: 42859.

SAE WITH ALL ENQUIRIES VISITORS BY APPOINTMENT ONLY

Fly with confidence & Double Cover!

MAP MODELLERS ACCIDENT PROTECTION

NOW WITH £500,000* COVER!

MAP Modellers Accident Protection Plan offers third-party insurance cover up to £500,000. The scheme now provides "member to member" indemnity. It is recognised by S M A E and by Local or Public Authorities.

How can you take advantage of this offer, which embraces all forms of modelling activity, whether it be concerned with aircraft, boats, cars, locomotives? Simple! Just complete the form below and send it, together with a remittance for £3.00 which will provide cover for 1 year.

*Excludes first £10 of any claim — was £25 — now reduced

P.O. Box 35, Wolsey House, Wolsey Road, Hemel Hempstead, Herts. HP2 4SS.

To: Insurance Office, Model & Allied Publications, P.O. Box 35, Wolsey House, Wolsey Road, Hemel Hempstead, Herts. HP2 4SS.

Name (in full) .....

Address .....

.....

Current MAP Insurance No. ..... Date .....

I enclose herewith postal order value £3.00 for membership of MAP insurance scheme

HANGAR DOORS

Mick Bates of Nuneaton M.A.S. proudly displays his APS 'Tomboy' after its 21 mile fly-away - see Lost and Found.

12000 and climbing

The *Society of Model Aeronautical Engineers* (SMAE) now has over 12000 members. After a drastic reduction in membership fees at the beginning of this year, there were fears that the SMAE might not attract enough members to make it's work financially viable. Those fears have proved groundless. The new form of membership (only £5 a year), including third party insurance, has encouraged many clubs to agree to 100% membership.

Although mostly seen for its organisation and backing for the competitive flier, the SMAE provides a behind the scenes support and administration for *all* model fliers. What must be in many minds now, is, can the SMAE maintain and even add to its healthy 12000 plus? This year it was not really possible to plan for any specific additional projects for the non-competitive flier — simply because it was not known what the financial input would be! Now the SMAE knows that the support is there — it must now plan for the future.

The SMAE is a highly democratic Society, and in some ways this is a burden that it has to bear. Activities planned by individuals, areas or the executive council have to have the endorsement of its members. That inolves communication and even with today's technology, that takes time. If *you*, have an idea or project you would like the SMAE to action — pass that idea on quickly, so that we can all reap the benefits.

With 12000 plus members the SMAE has both more power to sway outside bodies and a greater responsibility to those members. The SMAE is *you* the average modeller — what do *you* want?, if you don't tell somebody, you cannot very well expect miracles. The SMAE's address is Kimberley House, Vaughan Way, Leicester.

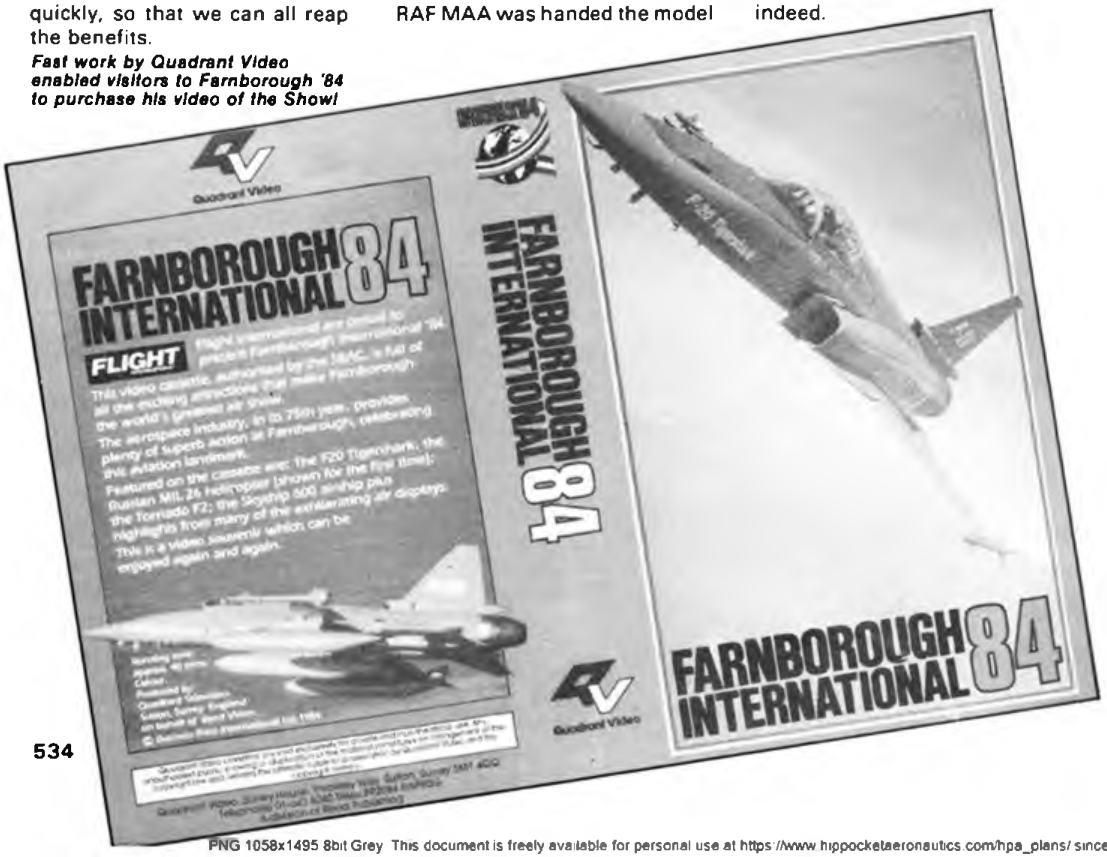
Lost and Found

Vintage Day at Old Warden on 19th August was a day to remember — models and modellers, in all directions. Sadly a number of models were tree'd or flew O.O.S. (out of sight). In hunting for one model, John Lawson found another: a free flight 'Humbug' powered by a 'Dart'. It appears to have been lost for some time as the model is beginning to disintegrate! If the owner would like to telephone John on 01-368 5438 and tell him a few more details of the model, then the remains will be returned. The engine, one must add, has not disintegrated!

Another happier tale came our way from Mick Bates of Nuneaton M.A.S. Mick was flying a free flight sports 'Tomboy' at R.A.F Barkston Heath at the August 'Nationals' — yes, you've guessed, it flew O.O.S. Having searched and searched — no 'Tomboy' and Mick had recently completed a few repairs and had not replaced the "if found" label! Fortunately all was not lost as 21 miles away a member of the RAF MAA was handed the model by a neighbour — knowing of the event at Barkston, the model was taken to SMAE Control and because the model has its SMAE number on it . . . 'Tomboy' returned home. Mick is now going to rename it 'Tomboy 21'!

Fast Video

You've heard of 'fast food', well now there is 'fast video'. Last month we mentioned a video film of the Red Arrows marketed by *Quadrant Video* of Sutton, Surrey. Having set out to produce a film of "Farnborough 84", it was decided to increase sales by having this available for the public *during* the show. The 40 minute video was shot during the trade demonstrations prior to the public open days. Working overnight *Quadrant* managed to get about 1,000 copies ready for sale the next day . . . fast work indeed.



Fast work by Quadrant Video enabled visitors to Farnborough '84 to purchase his video of the Show!

Coupe D'Hiver 1984

Aeromodeller's annual Coupe D'Hiver event will be on 2nd December. The venue will again be R.A.F. Henlow, Bedfordshire. The kind co-operation of the Royal Air Force continues to make possible the use of one of the country's largest all grass airfields.

As usual two events will be run: the 80 gram class for the Aeromodeller Cup and the 100 gram class for the Boutillier Trophy.

For security reasons it is essential that we receive notification of anyone wishing to enter either event. Please inform the *Aeromodeller* editorial office as soon as possible preferably including details of car registration number, together with the number and names of probable occupants.

All those entering will receive details of the competition and a map to locate the airfield . . . providing they tell us of their address . . . (hint, hint)

Book out of print?

Out of Print Book Service have a mail order system that will endeavour to find those books that you have been unable to find elsewhere. The search will cost you nothing, but if they find the book requested, you are then informed of how much it will cost. Even at this stage you are not bound to purchase the book. Should you have found it elsewhere or if you think the price is too high you may simply cancel your request. On the surface you can't lose! Minimum charge for a book will be £5.00 but, of course rarer editions may cost more! Just fill in one of their search forms, sit back and wait. Forms are available from *Out of Print Book Service*, 17 Fairwater Grove East, Cardiff, CF5 2JS.

Bite your tongue . . .

At the recent control line Nationals, we had an occurrence of behaviour that is not going to do model flying much good at all . . . Whatever the television or press would have us believe, bad langauge is neither the norm or something to be proud of! At the combat circles this particular 'nasty' was given even greater prominence . . . because the p.a. system was left *on* when it should have been turned *off!*

Most people would probably agree that competing for a National title raises the tensions and lowers breaking points. BUT, never forget that there are others present, who, especially with young children, quite rightly expect a reasonable standard of behaviour from all concerned. AND, these may be the people we are trying to impress, either to become aeromodellers, or even fund or support aeromodelling! One little boy was heard to say of one group of modellers: "they are not every nice, are they daddy?" In fact they probably were 'perfectly nice' — *outside that environment* — so bite your tongue ---- -----!

Today Aeromodeller, tomorrow . . .

In its time, *Aeromodeller* has been associated with many artists, giving them opportunity to show their talents and then eventually go on to greater things. Walter Wright was one of these talented aeronautical enthusiasts who first produced authentically coloured aircraft profiles which were a feature on the inside back cover of the magazine.

Walter left his native Leicester to take up work in the USA, but has never forsaken his affection for the homeland and his keen interest in portraying all kinds of aircraft in their true colours. Through *Leicester Prints* of 30 Loxwood Avenue, Worthing, Sussex 8N14 7QY, he has made available a set of 3 lithographs which cover aircraft of the U.S.A.A.F. in World War 2, the U.S. Airforce of today and aircraft of the Royal Air Force. Each makes a splendid wall decoration and is suitable for framing, being printed on stout card. The price is a modest £1.40 per print, which includes postage — remarkable value considering the investment in the colour reproduction.

Aircraft models at Oakhill Manor are part of a museum quality collection displayed in the Manor House near Shepton Mallet in the Mendips. Medal winners from Model Engineer Exhibitions and innumerable other exhibits make this a splendid place to visit. Transport from the car park is via steam train!

What's On . . .

October 14	**SMAE MIDLAND AREA 'FLY FOR FUN'** Venue: RAF Barkston Heath. Contact: G. Ferer Tel: 0633 886519. SMAE members come and 'Fly for Fun' — all activities. Welcome: informal contests also F/F contests for — A1, Vintage Duration, CDM, Slow Power.	November 11	**ANGLIA WAKEFIELD DAY** Venue: Watton. Contact: A. R. Wells, 26 Nelmes Way, Hornchurch, Essex.
October 14	**D.P.R. MODELS INDOOR FLYING DAY.** Venue: Middleton Hall, Milton Keynes. Contact: David Rawlins. Tel: 03708 8110. 1984 National Superglow Chuckie Championship finals, plus open Chuckie Champs and Fly for Fun.	December 2	**AEROMODELLER COUPE D'HIVER INTERNATIONAL — 80 and 100 gm classes.** Venue: RAF Helow. Further details: Aeromodeller, PO Box 35, Wolsey House, Wolsey Road, Hemel Hempstead, Herts.
October 21	**CROYDON GALA F/F/.** Venue: Beaulieu. Contact: N. Beaumont, Spring Cottage, Spring Street, Ewell, Surrey.	December 9	**FALCONS F/F/ GALA — Open G/R/P, Vintage.** Venue: RAF Lyndholme. Contact: B. R. Peers. Tel: Crewe 60893.

Photo Prize MODEL NEWS With Fliar Phil

Win a bumper bundle of balsa wood!

All entries should be good quality black and white or colour prints. Your name and address should be on the back of the print. Details if possible should be given about the model and its construction. Send all entries to: Aeromodeller, Photo Prize Feature, PO Box 35, Wolsey Road, Hemel Hempstead, Herts. HP2 4SS. Photos will be returned after publication.

WHEN the 'Moment of Truth' comes and we launch that new model on its FIRST flight, the old saying what goes UP must come DOWN is uppermost in our minds. Will it go UP — and if it does, how will it come down? Gently like the proverbial feather — OR do its best to dig a nasty great hole! This months masterpieces have obviously returned safely.

Photo 1
We start with this "get up and go" photo from Peter Martin of Birmingham, which shows the popular A.P.S. "Sporty". Of special interest is the gentleman launching it. He is Jack Humphreys (at the Warwick Wakefield Anniversary Meeting, June 1984), who *designed* "Sporty". Peter asks Fliar Phil "Is it a record that a designer is flying his own model after 36 *years*? It could well be Peter.

Photo 2
A rarely modelled aircraft is shown in this attractive photo. For those not immediately recognizing it, John Blagg of Hatfield, Herts., who sent the picture, says "It is a ½in - 1ft. scale model of the *Blackburn* MK. II". The real thing was in service with the Fleet Air Arm around 1925-31. Power is a *Telco* CO2, weight 3oz. A fine model John.

Photo 3
Some like 'em LARGE! But others have fun with *small* models. They certainly do not come any smaller than this control-line job. It spans a full EIGHT inches. (If you don't believe it, compare it to that fiver!). The photo comes from Richard Williams of Norfolk. The model was designed and built by Michael Williams, using mostly 1/16in. sheet. Power. *T.D.* .010. Flies on 20ft. lines. Fascinating!

WINNER

Fliar Phil is certain this fine "portrait" of a *Frog* 45 is going to recall some happy memories, especially for the "veterans" amongst us. Sent by Mr. P. O'Keeffe of Kent. The model was recently re-covered but retains the *original* transfers and S.M.A.E. insignia. Power is an early *Frog* 175 coil ignition engine, with original propeller. Basic structure and wheel are also original AND Mr. O'Keeffe has the kit BOX still intact! For a fine picture, full of good old nostalgia, Mr. O'Keeffe is this months winner.

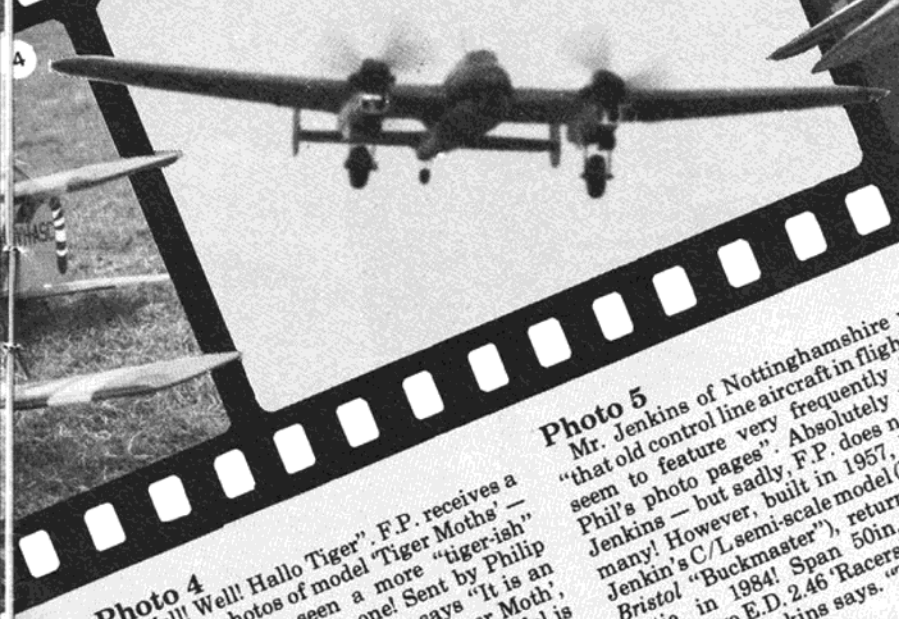


Photo 4
"Well! Well! Hallo Tiger". F.P. receives a number of photos of model "Tiger Moths' — BUT has never seen a more "tiger-ish" "Tiger Moth' than this one! Sent by Philip Morley of Middlesex. Philip says "It is an R/C model of an Australian "Tiger Moth', called by its owner "Tiger-Tiger". Model is from a *Veron* kit. Power: *Saito* 40 four stroke. *Macgregor J.R.* radio.

Photo 5
Mr. Jenkins of Nottinghamshire writes, "that old control line aircraft in flight do not seem to feature very frequently in Fliar Phil's photo pages". Absolutely right Mr. Jenkins — but sadly, F.P. does not receiver many! However, built in 1957, here is Mr. Jenkin's C/L semi-scale model (based on the *Bristol* "Buckmaster"), returning from "a sortie, in 1984! Span 50in, weight 4lbs. Power Two E.D. 2.46 'Racers'. Still flies well — *but*, Mr. Jenkins says, "The pilot is a bit rusty!".

Photo 6
It is a fact that aeromodelling has theraputic value, (helps you get better). This dramatic photo of his *Sopwoth* 'Tabloid' (*Shark* CO2 powered), from Keith Thomas of Somerset, was built when Keith was in hospital. Its construction, no doubt, pleasantly occupied him for hours that otherwise would have been jolly tedious. Built to Andrew Moorhouse's excellent plan. Span 23in.

Well Bretheren of the Model Aviation World thats it! See you again next month.

Remember folks, this is YOUR feature and Fliar Phil needs YOUR photos to keep it going!

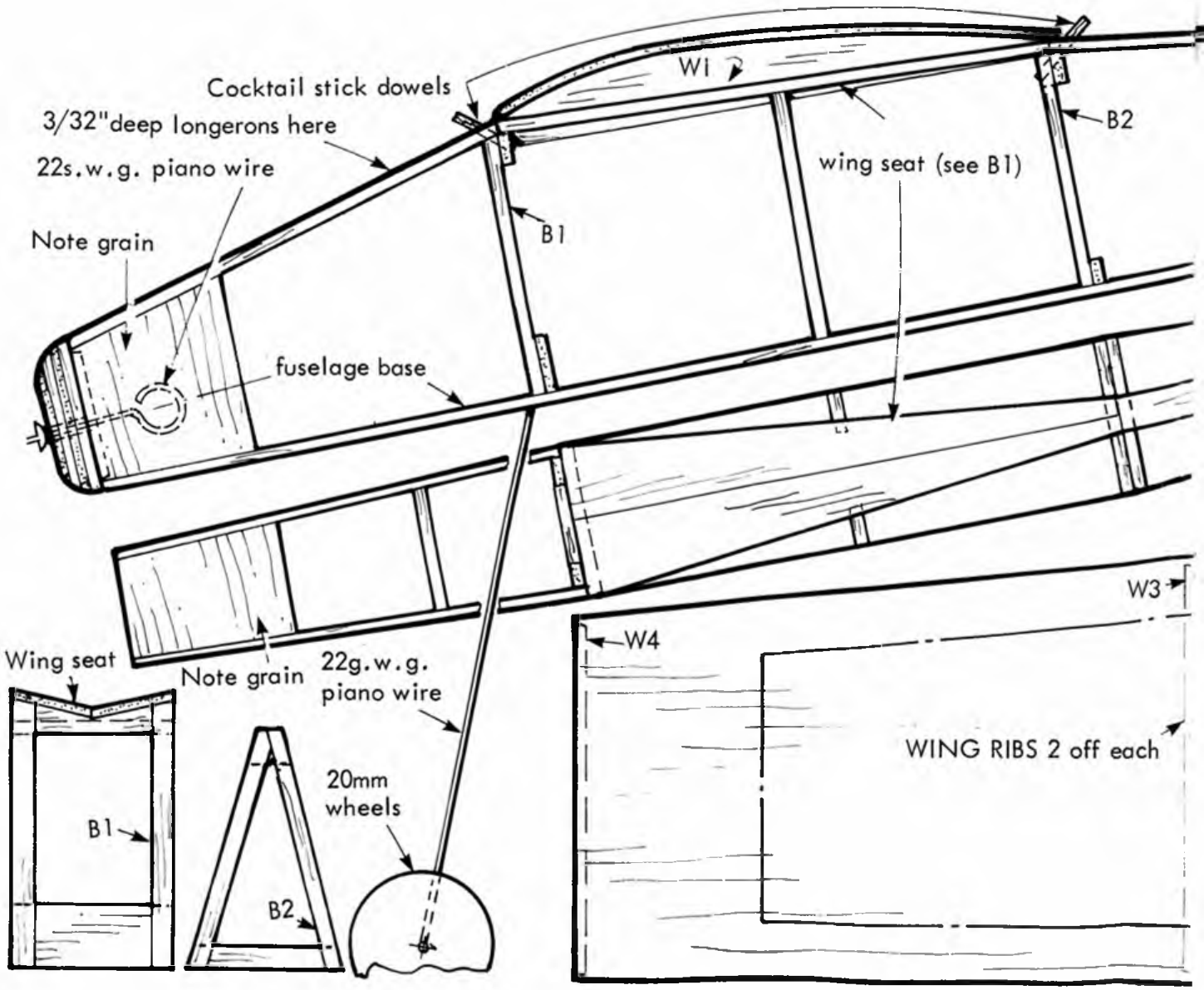
Mini-Minx

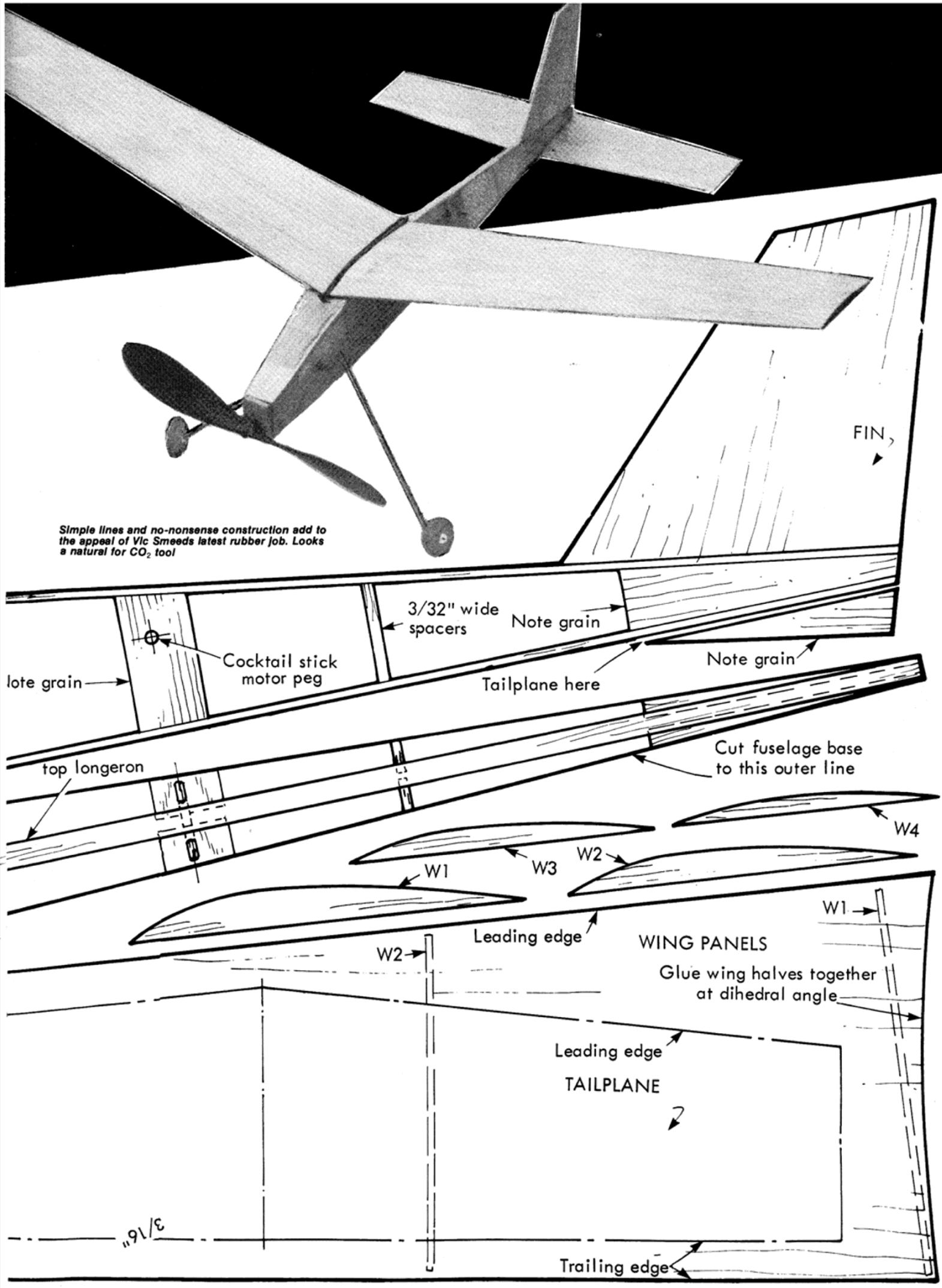
Just one sheet of Balsa is all you need for Vic Smeeds fun flyer

HOW BIG A MODEL can you get out of one stock sheet of balsa? Well, without making a hollow stick fuselage with tissue-covered flying surfaces, this 24 in. design must be close to the ultimate from a single sheet of 1/16 x 4 x 36 in. balsa. Nothing extra was used except wire, a 7 in. plastic prop, celluloid wheels, a scrap of tissue, a cocktail stick and a stub of tube for the shaft bearing. Plus, of course, a small amount of cement, dope, and rubber. Apart from the wing root and ribs, everything is straight lines, making the transfer to balsa simple, since very little tracing need be done; a 12 in. steel rule is really essential for cutting out.

Pick a soft sheet of balsa to keep the weight down and if there is a slightly harder edge, try to arrange to use this for the narrow strips needed for the fuselage. Cut out the wings, tailplane, fuselage bottom and fin; you will probably have to butt join a small triangle to make up the fin. Make up the two fuselage formers B1 and B2 over the drawing, trimming off ends when the cement has set and erect on the fuselage base. Use a matchbox to ensure that they are square and also to square up the nose side panels. Fit the two top longerons at the nose, the wing mount (two pieces angled to the dihedral angle) and the rear top spine and tail panels. Complete by cutting spacers to length and inserting, including the rear rubber anchorage and the top nose panel. The extra spacer between the longerons on top is only needed if the longerons are very soft. Bend the undercarriage and cement in place, adding a patch of tissue (paper hankey type will do) with cement rubbed through, to reinforce.

Lightly sand the fuselage to remove any





Simple lines and no-nonsense construction add to the appeal of Vic Smeeds latest rubber job. Looks a natural for CO_2 tool

SCALE MATTERS

Free Flight with Bill Dennis

Jetex

Those of you who are *SAM* members will know of the efforts in hand to resurrect *Jetex*, and I understand several *Jetex* models were flying at the recent Old Warden Vintage day. Until recently I had managed to pass my aeromodelling career without ever seeing one of these devices but at last year's Southern Gala, Vic Willson produced a *Veron* 'Sabre', complete with *Jetex 50*. Conditions were a little damp, but after some fiddling about the fuel ignited and with a hiss the model was away, cavorting around the sky in some exciting loops before gliding to rest on the runway. At this point, 'Eric the Undertaker' remarked that all that was missing was the traditional conflagration, whereupon there was a puff of smoke and the 'Sabre' went up in flames!

Undaunted, Vic has been building another one, this time to the larger *Veron* plans for the ducted fan version. The span is 36ins and Vic is fitting a 'Scorpion' motor with a thrust rating of 6oz. The projected weight is around 12 ozs. Watch this space for news of flight trials!

Documentation

Michael Smith has produced a very useful little booklet called the 'Scale Aeromodellers Documentation Directory'. There are fourteen pages listing suppliers of 3 views, photos and books plus libraries, associations and sources of hard-to-get items like tiny nuts and bolts, gears etc. Although Mike is a free-flight modeller, this will be of value to any scale type and is to be recommended. You can get a copy from Mike at 68, Armoury Drive, Gravesend, Kent, enclosing £1 and a 9 x 7in SAE.

Miscellaneous

You will have noticed that Alan Callaghan has relinquished the post of the "Scale Matters" scribe, and I'm sure you would all like to join me in thanking him for his efforts over the years. The column has not been taken over by one person, but rather a "consortium", and in this way we hope to maintain an even coverage of all the disciplines, although naturally there will be some "seasonality", with indoor being stressed during the winter months. I for one have no intention of generating a column month in, month out, as I want to build the occasional model, so we will be depending on you to send us input. This can be photos and details of your latest model, hints and tips or major articles. In particular I would like to hear about your indoor models and CO_2.

Speaking of Indoor, the date and venue for the 1985 Indoor Nationals has been fixed as April 28, again at the Alumwell Sports Centre, Walsall. Indoor is now established as the most popular competitive scale discipline, bar none, but it is also the most expensive class for which to lay on a meeting.

The cost of booking a hall large enough for the Nationals is rising each year, and this has to be met from the entry fees and "gate money". In a nutshell, the Nationals depend on your support, so please make a committment now to have your models ready for April.

SCALE AEROMODELLERS DOCUMENTATION DIRECTORY

Compiled by Michael Smith

£1

Above; Michael Smiths "Scale Aeromodellers Documentation Directory" - a scale modelling 'must'. Below; ducted exhaust to keep the model clean is a feature of Derek Knights Fairey "Fox".

Above; Veron "Sabre" for ducted fan motor being converted for large Jetex unit by Vic Willeson. Below, although John Palmers Vought "Kingfisher" is R/C, looks like a good subject for Rubber - for those who must build low wingers.

As seen in the national press

WIN a DREAM HOLIDAY in our GREAT COMPETITION

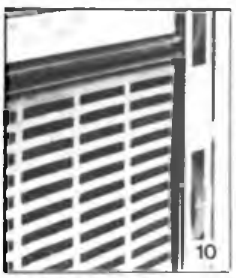
The Prizes:

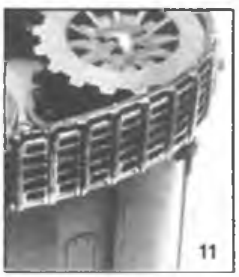
You could win £2,500 to be spent on a dream holiday of your choice for you and your family!

Second prize — a complete Canon portable video outfit worth £1,300.

Third prize — a BBC Model B micro computer plus software worth £450.

Fourth prize — Minolta X700 camera with a 50mm lens and flashgun, worth £280.





How to enter:

Just identify the twelve objects pictured opposite....

HINT — the Argus Specialist Magazines listed below might give you a clue:

Electronics Today International
Personal Computing Today
Movie Maker
Your Model Railway
Clocks
Home Computing Weekly
Beatbox
Ham Radio Today
Electronics
35mm Photography
Model Cars
Woodworker
Games Computing
Photoplay Movies and Video
ZX Computing
Military Modelling
Hi-Fi Now!
Winemaker
Citizens Band
Model Boats
Video Today
Popular Crafts
Which Video?
Your Commodore

and write your (one-word) answers in the spaces provided on the coupon. For instance, if you think that number 9 is a record, write 'record' in the space next to 9 on the coupon and so on. Then tell us in up to 20 words why **MAGAZINES MAKE IDEAL HOLIDAY READING.** Complete the coupon in BLOCK LETTERS, and send it to: *DREAM HOLIDAY COMPETITION, Argus Specialist Publications Ltd., No 1 Golden Square, London W1R 3AB,* to reach us no later than 31st December 1984.

Competition rules

1 The competition is open to all UK and Eire readers except employees of Argus Specialist Publications Ltd their printers and distributors

2 As long as an original coupon from the magazine(s) of your choice is used for each entry there is no limit to the number of entries per person. Photocopied coupons will not be accepted

3 All entries must be postmarked before 31st December 1984

4 The prizes will be awarded to the first four entrants who identify the twelve objects correctly and whose completed sentence is judged the most apt and original

5 No correspondence will be entered into about the competition results. The judges' decision is final

6 Winners will be notified by post and the results will be published in a future issue of this magazine

The 12 objects are

1. . . . . 2. . . . . 3. . . . . .

4. . . . . 5. . . . . 6. . . . . .

7. . . . . 8. . . . . 9. . . . . .

10. . . . . 11. . . . . 12. . . . . .

Magazines make ideal holiday reading because *(up to 20 words)* . . . . . .

. . . . . .

NAME *(BLOCK LETTERS)* _____ AGE *(if under 18)* _____

ADDRESS _____

Send to **DREAM HOLIDAY COMPETITION,** Argus Specialist Publications, No 1 Golden Square, London W1R 3AB.

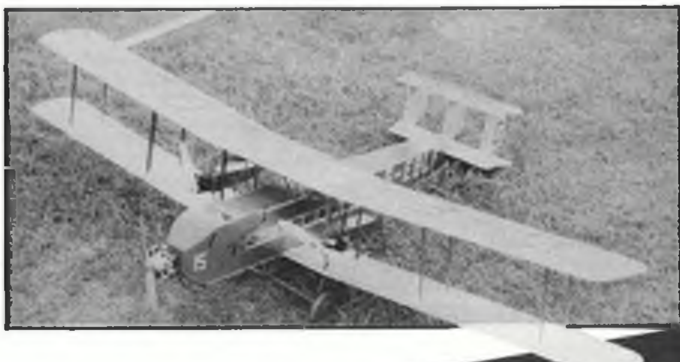
NATIONALS

SMAE EVER READY

Control Line and Scale Report

Right, Barrie Hotham's rubber powered General 'Aristocrat', beautifully built, but lack of R.O.G. kept it in third place. Below left, Paul Brigg's Kittyhawk carved and hollowed out from blue foam.

Below, this A. W. 'Argosy' by Bill Dennis placed second in Superscale span 56 in., power two Mills .75s – front propeller freewheels.



The weather this year was perfect for F/F Scale, and for much of the time it was difficult to find any wind into which to point the models! The entry of 20 was very healthy and not far short of that for the R/C event.

Power — Superscale Trophy

The quality of the models present was higher than any previous Nationals and the judges had a difficult job separating them in the static section. The first two flying rounds on Saturday evening are best forgotten, with only the Coates and Manley *De Havillands* performing well. Considering the stalls and crashes going on, it was surprising that only one model suffered real damage, when Bill Dennis' *Armstrong Whitworth* "Argosy" demolished a wing on an iron post.

The models performed better on Sunday evening and in particular Michael Smith's *Bristol* "Fighter" came right at last. Charles Newman put in a nice flight with the "Fox Moth", but it then developed some bad take-off habits. John Coker had put on a colossal amount of downthrust to cure a mega-stall on the *Spartan* "Arrow", and was rewarded with a very nice cross airfield flight, marred only by a scraped take-off. Of the other models, John Blagg's CO_2 *Blackburn* flew nicely but was always short on duration, while Derek Knight crashed his *Fairey* "Fox".

Overnight Bill Dennis had repaired the "Argosy", which is fitted with two *Mills* .75's. It made two excellent flights, with particularly realistic long take-off's and climb outs. However, even with the 10% bonus for twins, this was not enough to overtake Terry Manley's *D.H.* 4 which had impressed the judges with it's power-on landings.

Rubber-Model Flyer Trophy

Several new models this year, including Barrie Hotman's orange and black *General* "Aristocrat" and a stunning "Kittyhawk" carved from foam by Paul Briggs. There was also a parasol wing *Lockheed* "Air Express" by Barry Pursglove and newcomer Richard Waddington's *Piper* "Cub" which, although finished in coloured tissue, was accurate in outline, and was one of the few with a scale propellor.

In spite of perfect conditions, flying the model caused problems for most of the entrants, particularly when it came to the all important R.O.G.

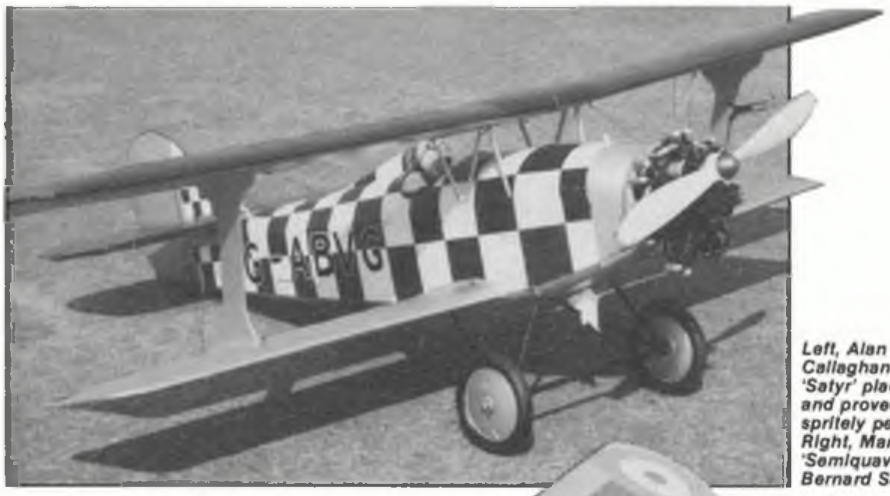
Exceptions were Mike Hetherington's veteran "Stosser", and the *Piper* "Cub", followed by Charlie Newman's "Storch". Nevertheless, everyone had a great time — if you want some *real* flying for fun, get into F/F scale at next years Nats!

Control Line Scale

The entry for this year's Knokke No. 2 Trophy even was a rather disappointing eight models. After the last few years where the entry has crept gradually up to around a dozen. However, the competition proved to be close fought and not without a little drama.

Both rounds of flying took place on Sunday in perfect conditions with no wind and pleasantly warm temperatures. The flight judges were Geoff Burkett and Derek Bird and the competition got underway at 10.30 with the *Handley Page* "Heyford" of Peter Stiles drawn to fly first, but after valiant efforts to start the second engine he ran out of time and called an attempt.

Mike Staples was next to fly, with the well proven *Bristol* "Bulldog" (last year's winner) apart from clipping the propeller during the "touch and go" and the inboard wing scraping the tarmac during taxying, the flight went well. Due to



Left, Alan Callaghan's Miles 'Satyr' placed 3rd and proved to be a spritely performer. Right, Martinsyde 'Semiquaver' by Bernard Sexton.

Right, the Bristol Bulldog of Mick Staples placed 2nd having only achieved a flight score in the first round.

Right, Wal Cordwell with Beechcraft 'Staggerwing' now sporting military colours.

Ron Truelove starting up his Heinkel 219 'Uhu', came first, even after an early incident with a landing light.

some dirt in the needle valve, when the second round was flown, this proved to be Mick's only scoring flight.

Alan Callaghan with a *Miles* "Satyr" flew next, having nominated a loop as one of his options. This manoeuvre almost ended in disaster as the model "mushed" at the bottom of the pull-out but previous experience ensured that Alan remained master of the situation. This first flight proved to be Alan's best as he performed a rather abrupt take off and bounced the touch & go during his second flight.

In complete contrast to the lightweight aerobatic *Miles* "Satyr", Ron Truelove's twin engined *Heinkel* 219 "Uhu" (Owl) with mainly mechanical options, appeared next, but after half a lap of its take off run the outboard engine nacelle struck one of the runway landing lights, severely damaging the cowling and the undercarriage doors (but not as severely as the landing lights which were demolished!).

Fortunately no structural damage had been sustained and after feverish activity the model duly appeared for it's second round flight and flew faultlessly, to gain the highest flight score of the competition. The action of the undercarriage doors during the touch and go and landing being most impressive. This flight and a high score (again the highest of the competition) assured Ron of the winning position and was just reward for the effort put into the model and the efficient way it performed.

Wal Cordwell was next to fly, but after starting the engine of the *Beechcraft* "Staggerwing", now in military colours, the undercarriage collapsed and he called an attempt. The "Staggerwing" became airborne for the second attempt, but struggled with an overheating engine and eventually shed an aileron to terminate the flight. During Wal's second flight the engine hardened up and eventually cut out, necessitating a (very neat) dead-stick landing.

Bernard Sexton's *Martinsyde* "Semiquaver" was next to take to the air and although it appeared to be a little twitchy, it performed well, but with limited options it was always handicapped as far as a high flight score was concerned. The second flight followed a similar pattern, but Bernard was by now gaining confidence in the model and this resulted in a higher score.

Dave Kenny was a last minute entry with his "Spitfire IX", in unusual Russian markings, but although the model was stable and adequately powered but the fact that it had a fixed undercarriage means that it's flight scores were inevitably low. The engine cut in mid flight during the second round and as the model was not presented for static judging it finished the competition at the bottom of the results table.

After his initial engine starting problems Pete Stiles flew the "Heyford" well during both rounds, but a combination of having only four flight options and throttles that would not shut right down resulted in rather low flight scores.

Chris Bradford, fresh from his fine showing at the recent World Championships in Paris performed his usual competent flight with the *Nieuport 17*, but seemed to be a bit off his best form, although he managed the second highest flight score of the competition.

After the static judging had been completed by Barry Hotham and Mike Hetherington Ron Truelove emerged the clear winner, with last year's winner Mick Staples second and Alan Callaghan once again third.

F.A.I. Team Race

Run by members of the "home" club Gratham & D.M.A.S. this year's event started with Round 1 on Saturday afternoon in conditions which should have resulted in faster times than were recorded by most teams. Many people seemed to have trouble in maintaining a setting throughout the race or were short on range. Notable exceptions were Smith/Brown with a very fast 3:32-7 using a *Cipolla* to head the list at the end of the round and Langworth/Broadhead showing an overdue return to their old form with a 3:44-6 with the *Nelson* . Circle Marshall Graham Howard sent all teams who recorded 3:55 or under to have their models processed by John Daly and by the end of the round only five models required checking. Thomason/Thomason would have been in the semi-finals with their 3:54.0 had their tank not been over 7cc, unfortunately they were unable to repeat such a good performance in the second round.

Times in Round Two on Sunday improved greatly with seven of the semi-finalists qualifying with times from this round, fastest being Sladdin/Ross with a fine 3:37.0 and Gray/Haycock with 3:39.9 both using *Nelsons*. Heaton/Woodside provided 3:42.3 from their *Cipolla* powered Kevlar fuselage model which did not underline their impressive performances in practice, they were regularly clocked at near to 18 seconds for 10 laps, however setting problems prevented full potential being reached. This model should be capable of sub 3:30 times and it is hoped that all will be sorted out for the World Championships in September. Little else was seen by way of new models with most teams using tried (or tired!) and trusted equipment. The only International entry this year came from

Above, winners of 1/2A team race. Horton/Harworth set a new heat record of 3:38 using Haworth 'special' motor. Above right, winners of F.A.I. team race for the sixth time running - Steve Smith and Colin Brown.

Above, Allcock/Myzska's winning class 'B' team racer, finished to applause from the crowd with a fast final of 7:06. Left Sladden/Campbell/Ross model finished 3rd in 7:38 including plug change!

Mackintosh/Olive over from Majorca but their 3:55.7 was not good enough for the semi-finals, the cut off time of which this year proved to be 3:54.4.

The Semi-finals on Monday produced several very fast times with the conditions being ideal for good racing. The first race in Round 1 of the Semi-finals had Sladdin/Ross maintaining their consistent performances of this year with 3:38.1 to reserve their place in the final. Langworth/Broadhead had a good clean run to record 3:45.5 but Davies/Banks had problems and could only manage 4:18. The second round was marred by a collision between Oddy/Home and Gray/Haycock. Hutton Oddy was judged to have been too low on landing over Steve Haycock's model and was disqualified with Gray/Haycock being awarded a refly.

As all 3 models had completed well over half distance, Wilson/Gardiner were obliged to finish solo but engine problems resulted in a slow time for them. The third race had to be split into two, two-up racers to allow Gray/Haycock a refly before the end of the round. Steve Smith and Colin Brown took advantage of their race with Heaton/Woodside to record a clean 3:37.8 with Derek and Jim at 3:47.8. If Jim Woodside had not required a third pitstop 2 laps from the end they may have qualified for the final as the airspeeds of the two models were very even, both *Cipollas* sounding very healthy. The last race was between Gray/Haycock and Tribe/Yeldham with John Gray benefitting from the retirement of Tribe/Yeldham at their second stop to record a 3:33.0 to put himself in the final.

The second round of semi's resulted in improvements for only two teams, Sladdin/Ross with a superb 3:32.7 and Ev Davies and Dave Banks who made 3:45.4 in the same race.

So the final was to be between the *Nelsons* of Sladdin/Ross and Gray/Haycock and the *Cipolla* of "works" flyers Smith/Brown. All three models were away instantly at the start with John Gray having the highest airspeed with an impressive 18.9/10 laps. The first pitstops were performed virtually simultaneously by the three teams and at that stage it was anybody's race. John Gray's motor seemed to cool off rapidly on the glide and would take off very slowly and come on after about three laps despite good pit work from Steve Haycock. Steve Smith was gradually easing ahead thanks to a consistent engine run and super pit stops from Colin Brown. Meanwhile Martin Sladdin's engine was going "off" and in his efforts to get the model dowr fast to Malcolm Ross he clipped the lines of Gray/Haycock with his wheel when both models were landing together. Martin managed to get his model to his segment but Steve Haycock was a little delayed in retrieving his model but was then able to continue unabated. In the final stages of the race Martin Sladdin picked up one warning too many for assisting his ailing motor and was red lighted leaving Steve Smith and Colin Brown to come home first in the fast time of 7:19.4 with Gray/Haycock at 7:33.0.

So Steve and Colin have made it six National wins in a row a remarkable achievement which ought to receive special recognition from the S.M.A.E. for this popular team.

½ A Combat

Flown on Saturday in what can only be described as ideal weather conditions ½ A Combat proved to be fulfilling its intentions by providing a necessary introduction to combat for many new faces. Model design has progressed over the few years since the introduction of this class to National status with many models now performing as well as their early 2.5cc diesel counterparts. Run on a knockout basis with 1st round losers re-entering via a repacharge the many competitors were gradually eliminated until just 4 combatants remained. In the semi-finals G. Flood of Ireland was defeated by Nick Stowe and Mike Whillance of Urmston beat J. Willows. In the fly-off for third and fourth, Flood beat Willows to take third place warning of the Irish challenge that was to continue for the whole weekend.

And so to the final between two established combat exponents, after 4 minutes of fierce aggression Nick Stowe emerged the winner by one cut to nil, with Mike Whillance taking 2nd place.

Class A Combat

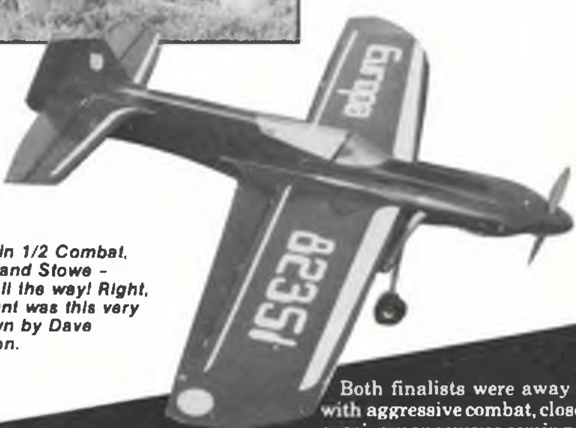
Class A Combat again proved very popular with 24 entries. Run on a knockout basis with only one model allowed to each contestant per bout. In nearly rounds model design and strength often proved to be the deciding factor, as did the ability to achieve a constant engine run.

As a result of hard fought combat bouts over rounds 1, 2 and 3 an eliminator eventually produced 8 flyers to contest the quarter finals in which D. Harrison beat J. Holland, J. Hammersley beat M. Whillance, M. Tiernan lost to M. Jones and T. Bartram beat I. Horne.

The semi-finals provided some exciting flying with Tim Bartram and Dave Harrison emerging to contest the final beating John Hammersley and

Above, Dave Harrison, winner of both F.A.I. and Class A Combat - nifty flying all round, seen here with 'A' model. Right, Nick Stowe winner of 1/2A Combat.

Below, John Hammersley's model launched for his semi-final against eventual winner Dave Harrison.



Above, top three in 1/2 Combat, Flood, Whillance and Stowe - aggresive flying all the way! Right, seen in Novie Stunt was this very nice 'Europa' flown by Dave (Sandy) Sanderson.

Mervin Jones respectively. Jones went on to take 3rd place from Hammersley in the fly off, setting the scene for what was to be a memorable final.

From the signal to launch, both models roared into the sky with Dave and Tim looking for that important first cut. Following about a minute of hetic combat Dave scored a cut but in the process destroyed Tims model leaving Dave to fly out the remainder of the bout solo to emerge clear winner.

F.A.I. Combat

Nationals F.A.I. Combat, the Blue Riband Combat Event for the Witley Straight Trophy attracted 24 entries this year with contestants using a variety of engines in a bid to gain maximum air speed, *Nelsons, USE's* and *Cipolla's* were all seen along with the usual *Super Tigre* G 20/15's, these motors combined with glass fibre propellors pushed the average model speed significantly higher than that of previous years, indeed from an examination of the results, only one person using *Super Tigre* powered models won in the first round and three in the second!

In round three in some excellent Combat bouts, I. Kennedy beat J. Wilson, J. Jones beat G. Flood and D. Harrison beat V. Hunt. Whilst spectators of Round 4 were entertained and enthralled when J. Holland beat I. Kennedy. Run on a two life system to the semi-finals 5 flyers remained in the competition S. Malone, J. Jones, J. Hammersley, V. Hunt and D. Harrison. In the eliminator to give the semi finalists a repeat of a bout saw Hammersley again defeated by J. Jones 2 cuts to 1.

The semi-final proved to be matches of contrasting styles. D. Harrison beat S. Malone in a fast and furious battle to win a place in the final. Whilst J. Jones having the misfortune to get a heavily four stroking run against V. Hunt, flew for 4 minutes only inches from the ground to achieve a win by virtue of Vernon grounding twice attempting to take cuts from John's streamer. Vernon Hunt easily defeated Steve Malone to take 3rd place leaving the final to be fought out between John Jones and Dave Harrison who was in his second final in two days.

Both finalists were away at the signal to start with aggressive combat, close following and clever evasive manoeuvres coming from both. A cut from Dave Harrison was however quickly followed by a line tangle which sent John Jones crashing to the ground. A model change was quickly carried out by John's pit crew but another tangle left John again on the ground. Propeller changes and starting problems kept John on the ground for most of the remainder of the bout leaving Dave to add the F.A.I. Combat title to the Class A Combat title won the previous day.

Aerobatics-Gold Trophy

With a total entry of 23 (20 eventually recorded scores) the entry was lower than it has been for many years. However, this allowed four preliminary rounds to be flown in one circle over the first two days using three judges. Mike Harvey, John Harley and Alan Church. The positions from the preliminary rounds were based upon each flier's best score from each day. The top ten then went forward to an independent three round fly-off on day three (best two scores to count). The judging panel on the last day was joined by John Perry and Pete Tindal, with top and bottom judges' scores for each flight being discarded. The event ran smoothly with Contest Directors, John Lynch and Mike Feaver assisted by members of the Dagenham Club.

Weather was almost too good for most of the event with flyers trying to find a little wind at times to help line tension and direction.

First man away in the unenviable pole position on Saturday morning was Bill Draper flying an *Enya* 45 powered modified 'Superhawk' which was still being trimmed for the World Champs in U.S.A. He was followed by Scottish flyer Ian Galt with a new *ST60* powered model and then another *ST60* enthusiast Peter Burgess with a large 'Magic Moments'. Barry Robinson recorded top score of round 1 with high scores also from Tony Eifflaender, Nev Dickinson and Peter Arkley. John Hamilton from Ireland was flying a *ST* 46 powered 'Genisis' derivative with a fresh patch on the wing from a practice accident, an another Irish flyer Maurice Doyle was using a *ST* 46 "Genisis", very quiet with a modified *Enya* silencer. Peter Arkley also used an *ST* 46 in his attractive 55oz. 'Superhawk'.

Round 2 was opened by Arthur Tipper with yet another *ST* 60 in his 'Tara' for a much improved score. Nev Dickinson followed up using a *Merco* 61 in his 'Norstar' for a very high 958 and to set new goals to reach to be immediately overtaken by World Champs team mate Bill Draper to set the highest score of the day. Tony Eifflaender took over second spot for a while with his *PA W* 35 diesel lightweight until Barry Robinson again scored highly just behind Bill. Glen Alison was unfortunate to lose a prop blade during take-off, the model taking to the air with the shattered prop and Glen had to put it down quickly, the model disappearing under bodies intent on stopping the shaft run. However, the *Fox* 59 appeared little worse for wear in later rounds.

Round 3 opened on Sunday and was eventful for several flyers. Tony Eifflaender's model striking a landing light in practice on landing and damaging the wing, causing him to fly his reserve model (very similar) in the round. Barry Robinson's *Merco* 61 went very lean and stopped halfway through the flight due to a lost pressure line and Arthur Tipper aborted his clover due to a spluttering motor. Bill Draper again topped the round with Nev Dickinson, flying last, taking second spot.

Round 4 was opened by Richard Illingworth with a useful looking flight from his *Enya* 45 'Superhawk', but forgot his hourglass and paid a high price in points. No mistakes this time from Arthur Tipper or Barry Robinson, taking third and second places in the round with Bill Draper still holding his lead. Tony Eifflaender flew his now repaired number one model again and a big effort from Reg Lowe just failed to gain a place in the fly-off after chasing Dave Day's first day score, Dave using a 25 year old *Merco* 35 in his 53 oz. all sheet 'Nobler'.

Fly Off

Barry Robinson's 'Northwind' took the air to open the fly off followed by Tony Eifflaender's diesel powered model. Maurice Doyle had a practice accident due to failure of his control handle and wrecked his number one model, so was forced into using his somewhat overweight spare, a similar model but some 6 oz. heavier with detrimental effects on performance. The round went without incident, with Bill Draper again taking the lead on round 1, most flyers flying to

Above, first three places in Novice Stunt taken by (left to right) Terry Bradley (2nd), John Kergon (1st) and Kim Jones (3rd).

Above, John Kergon flew this OS 35 powered, American profile design - 'Metaphor' to first place in Novice Stunt.

Above, Mini-Goodyear finalists - Higgins/Horwood (2nd), Gough/Gough (1st) and Thorpe/MacAlpine (3rd).

Above right, Tony Eiffaender's lightweight PAW 35 diesel powered 54 in. model reached fly-off and placed 4th.

their earlier form.

The second round, opened by Bill Draper, saw a change in top positions as Barry Robinson achieved a high score to inch into the lead whilst Tony Eifflaender's flight was cancelled due to jettisoning a wheel in flight. This was almost certainly due to his earlier fracas with the landing light which probably cracked the soldered joint on the retaining washer. Arthur Tipper now moved up to third place ahead of Nev's 'Norstar'.

Round three looked set for tie break, with the gap so close between Bill Draper and Barry Robinson, flying very different styles but achieving similar marks. Nev Dickinson again usurped Arthur Tipper to take third place finally by only a couple of points, whilst a big effort by Tony Eifflaender came too late to catch Arthur and it was left to the last two flights between Bill and Barry to decide the winner, both achieving high scores under good conditions, but Barry's big "Northwind" holding his position and earning the Gold Trophy for the third time in five years.

Novice Stunt

The first round of Novice Stunt was run on Saturday afternoon when the wind was fairly strong. An early casualty was Terry Bradley who crashed after breaking his propeller on take-off, the resulting vibration tore the front of the fuselage off. He did very well to repair the damage overnight to eventually place second. Flying was of a very high standard for Novices and the top placed fliers are now all capable of flying in the Open Class. John Kergon of Widnes flew the American profile design 'Metaphor' very smoothly to take top place.

Interesting variation on a kit design was the model by Kim Jones who had "redesigned" a *Sig* 'Chipmunk' into a vintage style and called it a 'Wagtail'.

For the final two rounds on Sunday the wind dropped and the scores rose and made flying more enjoyable in this well organised event.

How about some more entries next year, you can see a profile "ship" can be quite good enough to win! Judge Robert Dulake.

Mini-Goodyear

This event, run by the South Bristol MAC, once again attracted a good entry with a strong contingent from Scotland competing. The first round, on Saturday afternoon, saw good times from Thorpe/McAlpine from Scotland with 4:34, Johnson/Baker with 4:48 and Langworth/Morell from Wharfdale with 4:52. In the second round there were spectacular times of 4:19 from Higgins/Horwood of South Bristol using a standard MK II Schneurle port *PAW* and 4:12 from Gough/Gough of Wolverhampton with a DS piston liner assembly on a MK I crankcase. Fuel tank processing however produced some embarrasing results and teams were told to go away and get their tanks correctly sized before the Semi-finals. In the first semi-final Higgins/Horwood recorded a 4:33 with a motor noticably heating-up towards the end of the race whilst the consistent Johnson/Baker team turned in a 4:57. The second semi-final was a very close affair with only 19 seconds separating the teams and Gough/Gough coming out on top with 4:31 followed by Scully/Walker on 4:45. In the third semi-final Thorpe/McAlpine were just unable to beat Scully/Walker's time finishing with 4:47.

Unfortunately some doubts were cast on the eligibility of some supposedly standard unmodified motors that had been used and in order that fair play was seen to be done the final was postponed until the Monday when it was hoped that Tony & Gig Eiffleander would check the engines to see that all was well. The examination showed Scully/Walker's motor to have been extensively modified and so Thorpe/McAlpine were called into the final after passing the processing.

The Final, held immediately before the FAI Team Race final, saw all teams away well with a slight advantage to the Bristol Team of Higgins/Horwood. Poor Nigel Higgins was somewhat dwarfed by the other two older pilots and misjudged an overtake after about 10 laps ending in the ground. A quick start and they were away again but the advantage was now clearly with Gough/Gough who had the greatest airspeed but slightly inferior pit stops. In the meantime Thorpe/McAlpine with pilot fresh from the Novice Goodyear final contined well but with less airspeed than the other two. Gough/Gough completed an almost perfect race to win in 9:05.4 from Higgins/Horwood in second with 9:31.6 and Thorpe/McAlpine in third with 10:05.2.

Class II Goodyear

In its second year this class attracted 12 entries compared with 3 last year. In this event where airspeeds tend to be very similar, pit stops are paramount and the teams to do well are those with the most reliable starting techniques. The teams to reach the final were fastest Clarkson/Needham in 5:39 closely followed by Pegg/Thorpe in 5:44 and Andrews/Horwood in 5:49. The former two were using 360 degree port PAW 249 motors whilst the later used a MK I schneurle PAW 249. In the

Above, Class 2 Goodyear Finalists - Clarkson/Needham (2nd), Pegg/Thorpe (1st) and Andrews/Horwood (3rd) all using P.A.W. motors.

Above, fastest Novice Goodyear at 4:14 were Dagliesh/Dagliesh. Below Goodyear winners in record time Ed Needham and Dave Clarkson.

Above, Novice Goodyear winners Whorton/Salisbury - respectable final time of 8:54
Right, Norman Ashford with winning Profile Carrier model.

final Pegg/Thorpe got away to a perfect start leaving both Ed Needham and Bob Horwood trying to coax life out of their reluctant motors. Not only did Pegg/Thorpe have the best starts but they also had the best airspeed and assuming no mistakes always looked like comfortable winners. Such proved the case with Pegg/Thorpe winning comfortably in 11:09 and Clarkson/Needham second in 12:14 whilst Andrews/Horwood were forced to retire on lap 106 when Bob Horwood cut his finger badly on the propeller.

Open Goodyear

This event, the first racing event to start on the Saturday, was away to a slow start due to lack of organisers and all credit to Mark Jervis and John Daly who stepped into the breach at the last minute. The delay did have the advantage of allowing the weather to warm up after a cold start and Pegg/Thorpe took full advantage of a two up first race to record a 4:04 which was good enough for the semi-finals. In the second race also a two up Andrews/Horwood failed to take advantage bouncing the Nelson powered Argander at lap twenty and forcing Catlow/Jephcott with their Rossi powered model to participate in a three-up re-run. Not to be daunted, they went on to record a comfortable 4:07. There were no spectacular times in the first round though Clarkson/Needham had recorded a 4:01 to book a semi-final place with their now familiar pressure fed Rossi powered Mr. D. The fastest model around was undoubtedly the Rossi powered "Argander" of Allcock/Chambers who were unable to cash in with an early rich setting.

In the second round times rapidly improved and those who had felt safe with times around 4:20 were soon wishing that they had gone a few seconds faster. Andrews/Horwood recorded a smooth 4:02 and relative newcomer Dagliesh/Dagliesh a good 4:14 to book an almost certain place in the Novice final. Unluckiest team were Thorpe/Swinburn who tied with Sladdin/Snowden on 4:19.6 only to be eliminated from the semis on their poorer back-up performance. This round saw some more spectacular times particularly from Clarkson/Needham with 3:53 and Allcock/Chambers who sorted their model to record a new British Record time of 3:49.3.

The semi-finals proved a close fought affair with Andrews/Horwood setting the pace in the first race by recording 4:02.4. In the second semi-final Pegg/Aberdeen produced a 4:07 and Green/Malcolm a 4:04 with their motor slowing noticably over the last ten laps. In the third semi were the three fastest teams from the heats and both Clarkson/Needham and Catlow/Jephcott produced good performances to record 3:54 and 3:55 respectively but once again Allcock/Chambers were unable to realise the full potential of their model. In the second round of semis Green/Malcolm and Pegg/Aberdeen failed to improve on their first round times in the first heat and so all eyes were on Allcock/Chambers in the second heat. The race got away well but after about 20 laps came disaster when the down line on Dagliesh's model broke producing two loops. Luckily quick action by the other two teams avoided a multiple crash and they lived to fly again in an immediate two-up re-run. Once again Allock/Chambers were to be disappointed when a faulty refuelling system caused over-priming of the engine and resulted in two poor pit stops. This left the three teams who were already in the open final to fly in the third heat. Some quick consultations and discretion proving the better part of valour, this race was abandoned by mutal consent and not a few sighs of relief from Andrews/Horwood.

The Novice final should have been between Dagliesh/Dagliesh, Whorton/Short and Thorpe/Swinburn but the accident suffered by the former in the semi-finals forced their withdrawal allowing Crawford/Vaughan to take part. All teams were away well but it was soon obvious that Crawford/Vaughan were outclassed and the race was between the other two evenly matched teams with the winner being the team with the better pit stops. In the end this proved to be Whorton/Short in their first ever Novice Final who finished in a time of 8:54 with Thorpe/Swinburn second in 9:14.2, a very creditable performance for a Junior pilot, and Crawford/Vaughan third with a time of 10:03.5.

The Open Final was expected to be close with only 7 seconds separating the semi-final times of the participants. Andrews/Horwood got marginally the best start from Clarkson/Needham with Catlow/Jephcott a close third. The latter team had the best airspeed with the other two very closely matched. Catlow/Jephcott received two early warnings for high flying but then the race settled down into a steady pattern. A somewhat enthusiastic fourth pit stop seemed to have produced no ill effects for Andrews/Horwood but when coming in for their fifth stop at lap 125 the tail was found to be fractured and forced their early retirement. Meanwhile Ed Needham was performing his usual immaculate pit stops making up for some of their airspeed disadvantage and perhaps this plus the heat of the moment caused John Catlow to forget the two early warnings and start a whipping session which resulted in their third warning and disqualification. This left Clarkson/Needham to finish unopposed but recording a new British record time of 7:58.3 as well deserved winners with Andrews/Horwood in second place and Catlow/Jephcott in third.

Control Line Carrier

Competitions were held for two separate classes, Open Carrier where scale models attract 100 scale bonus points and 40 Profile Carrier.

Open Carrier

Six entrants made twelve attempts at ten flights all of which resulted in landings back on the deck, nine scoring 100 (max.) points. Placings were decided by the best single flight over the 3 days of competition.

It was a pity that only one "scale model" was entered, this by Bryan Youngs of the Broadlands Club who flew an *Irvine* 40 powered Guardian to record a very credible 495 points made up from a 71.68 m.p.h. fast and a 18.74 m.p.h. slow. The other five entrants flew their profile models.

Second was Norman Ashford flying a "Sea Harrier" inspired creation powered by an *H.P.* 40 whose 429 points was made up of 79.61 m.p.h. fast, 14.06 m.p.h. slow and 100 landing points. Vaughan Miller, of Feltham, was third with 412 points (84.08, 18.40, 100).

Profile 40 Carrier

Although the entry was down on previous years this in no way distracted from the competition. To maximise the flying it was agreed that a maximum of two flights would be allowed on each of the three days and that the highest scores

Left, Got it! Joe Myzska makes firm connection with his model during very fast second round heat of 3.28

Above, winner of Open Carrier – Bryan Youngs with Irvine 40 powered 'Guardian'. Above right, Peter O'Sullivan's Profile 40 Carrier 'Corsair' on final approach, placed 2nd.

Above, Open Goodyear finalists, after the fast and furious final – left, Catlow/Jephcott (3rd), Needham/Clarkson (1st) and right Horwood/Andrews (2nd).

Above far right, Mike Billinton's OPS 60 contender for the 10 c.c record stakes, looked on fine form as Mike worked hard over the weekend, until . . .

Right, . . . fire extinguishers had to be called for, to douse Mike's hopes, as his model literally fired up!

recorded on each day would be added to decide the individual placings. Also, for the first time, in an SMAE competition it was unanimously agreed that the 75 m.p.h. maximum speed rule would be ignored, that is, speeds in excess of 75 m.p.h. would be calculated as recorded and not reduced to 75 as per the provisional rules.

First off was Don Powell of the Witham Club, flying a modified *Dumas* "Corsair", to score 370 points (72.55, 23.55, 100). Bryan Youngs followed with his American influenced low wing model but was unfortunate to drop in the drink during the low speed part of the flight. Only minor damage occured, and after a quick repair he showed us all how to do it with a flight of 419 points (80.69, 16.24, 100). This score was to lead into Sunday.

Sunday also provided good weather (two good days in succession must be a record for Barkston) and everybody set about trying to catch up on Bryan Youngs who was the only person not to score higher on the second day. The gap was closing as Norman Ashford and Jeremy Peacock (Broadlands) scored 428 and 404 respectively, and Peter O'Sullivan and Don Powell (Witham) scored 410 and 400 points.

Monday was again an excellent carrier flying day but everybody started cautiously so as not to ruin the good scores that had so far been built up. Bryan Youngs had the misfortune to drop in the drink when his engine cut out during the slow speed part of a practice flight and bent the motor's crankshaft, this ruling him out. The pressure was now off and making the best advantage of the light wind Norman Ashford recorded 428 points (79.97, 14.46, 100) to take over the lead. Other notable scores on the final day were Derek Bird, Three Kings, 394 points, and Vaughan Miller, Feltham, 397 points.

In this class 44 attempts were made to make 36 flights and 32 landings back on deck, 26 of which commanded maximum landing points.

Control Line Speed

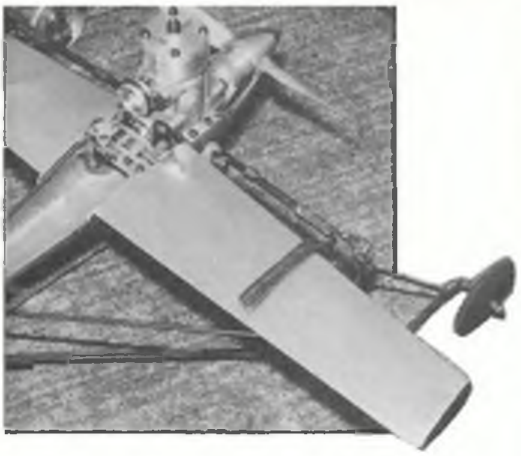
Is it significant that 1st and 2nd placings in the always hotly contested UK Nationals went to individuals now no longer burdened with C/L Speed organisation and other duties. Whilst this year's hard-pressed committee (Dick McGladdery (Chairman), Paul Eisner and Martin Radcliffe) gained placings seeming to reflect the theory's other face. Certainly last year's Chairman — the now "unleashed" Pete Halman, is charging forward in 1984 with a recent spate of UK FAI class records, and now in this Nationals yet again upping the FAI record with a superb 164.25 m.p.h. to achieve 1st place with a high Handicap percentage of 104.19%. His *Rossi* 15 is now working even more effectively with the multi-cone tuned pipes now currently in use in this class.

Big-hearted Ken Morrissey's 2nd placing also was a significant factor in this latest 'Sharston Rules' campaign — having additionally recently recovered from serious and threatening physical disability, he appeared to doubly gain in the amount of enthusiasm and energy he poured into the strenuously demanding 10cc event. Standing shoulders above the other entrants in the class, he equalled the existing 200 mph record (and thus a rare and precise 100.00% Handicap). Later, outside the contest hours, he officially broke that record with a further awesome 201.35mph (this time a unique 11.11 secs. for the Kilometre); whilst the last day of the contest saw his last official flight ruled 'too high" . . . most stop watches reading 11 secs. or just below! Nevertheless Ken has now taken this largest Class record back to a deserved, though somewhat unfamiliar, resting place; though its a matter of some humour that he arrived at the Nationals highly disillusioned with his '17,000 RPM and 156 mph *OSVR*' . . . but astute detective work soon gave some correct answers to his strictly non-existent H.P. 'problems'.

His large 38 oz. model was flown on 2-line system using 'groupers' and was propelled along by 70% Nitromethane and a small 7.8 x 11.5in. *Rev-up* propeller, and it was interesting to see him join that very positive and 'simplistic' pen-bladder and minipipe brigade — proving there's life after a full tuned pipe. (Martin Radcliffe again provided invaluable service as needle valve controller to push this 10cc record yet further away from his very own deserving grasp!)

Amongst other noteworthy activity Feltham's Dave Brewin was finally unplaced in 21N (Newcomer) class due to the harshly sad fact of a 'lost' record claim at 159.9mph. when engine capacity of his *K&B* 3.5cc measured out to an implacable 3.503cc. also thus disallowing his earlier 'slow' timing of 142.03 within the Handicap results.

Also coming up with unusual figures was Frank Chambers (Bilston) providing precise repetition of his 21N speed of 152.71 in the '83 Nats. though this time his advancing experience forbade his entry in the 'Newcomer' class, thus making the provisional Formula 21 class now the natural outlet for his very fast *OPS* 21 rear exhaust/mini-piped/nitro burning craft.



RESULTS

Free Flight Scale

Power	Model	Flight	Static	Total
1. T. Manley	DH4	1234	1063	2297
2. W. Dennis	AW 'Argosy'	1280	1003	2283
3. E. Coates	DH4	1060	1027	2087
Rubber				
1. M. Hetherington	F. W. 'Stosser'	1110	895	2005
2. E. Waddington	Piper 'Cub'	1052	768	1820
3. B. Hotham	'Kittyhawk'	665	1082	1677

Control Line Scale

Pos.	Name	Aircraft	1st Flight	2nd Flight	Static Flight	Total
1	R. Truelove	*Heinkel* 219	—	1047	1215.5	2262.5
2	M. Staples	*Bristol* "Bulldog"	771	—	1130.5	1901.5
3	A. Callaghan	*Miles* "Satyr"	846	795	1012	1858

Gold Trophy — Aerobatics

Posn.	Name	Rnd 1	Rnd 2	Rnd 3	Total
1	B. P. Robinson	927	984	990.6	1974.6
2	C. W. Draper	942.3	964.3	979.3	1943.6
3	N. C. Dickinson	904	917.3	949	1866.3

Novice Stunt

	Model	Engine	Score
1. Kergon	'Metaphor'	*OS* 35	867
2. Bradley	*Sig* 'Chipmunk'	*Merco* 35	861
3. Jones	'Wagtail'	*OS* 35	857

Mini Goodyear

1. Gough/Gough	4:12	4:31	9:05.4
2. Higgins/Horwood	4:19	4:33	9:31.6
3. Thorpe/McAlpine	4:34	4:47	10:05.2

Class 2 Goodyear

1. Pegg/Thorpe	5:44	11:09.1
2. Clarkson/Needham	5:39	12:14.3
3. Andrews/Horwood	5:49	Rtd.

Open Goodyear

1. Clarkson/Needham	3:56.1	3:54.2	7:58.3
2. Andrews/Horwood	4:02.7	4:02.4	Rtd.
3. Catlow/Jephcott	4:00.0	3:55.6	Disq.

Open Carrier

Pos.	Entrant	Club	Score	Motor
1	Bryan Youngs	Broadlands	495	*Irvine* 40
2	Norman Ashford	Broadlands	429	*H.P.* 40
3	Vaughan Millar	Feltham	412	*O.S.* 40 FSR

Profile 40 Carrier

Pos.	Entrant	Club	Score	Motor
1	Norman Ashford	Broadlands	1267	*H.P.* 40
2	Peter O'Sullivan	Witham	1187	*Webra* 40
3	Jeremy Peacock	Broadlands	1181	*Irvine* 40

Speed — Handicap

Placing	Entrant	Club	Class	Motor	MPH	Handicap Percentage
1.	Pete Halman	Sharston	FAI	*Rossi* 15	164.25	104.19% — New Record
2.	Ken Morrissey	Sharston	60	*OS* 61 VR	200.63	100.00 — Equals Record
3.	Frank Chambers	Bilston	F21	*OPS* 21 RE	152.70	99.52
4.	John Allcock Jo Myszka	Bilston	09	*Webra* 1½	129.31	98.85
5.	Paul Eisner	Feltham	FAI	*Rossi* 15	154.17	97.79
6.	Dick Miles	Feltham	F40	*K&B* 40	168.45	97.52

Class Results (Speed)

0.049 cu. in.	— Nil		21N	— P. Owen		126.67
0.09 cu. in.	— Allcock/Myszka	129.31	F21	1 — F. Chambers		152.70
0.15 cu. in.	— P. Eisner	178.11		2 — G. Bryant		142.49
F.A.I. 1	— P. Halman	164.25	.21	— Nil		
2	— P. Eisner	154.17	0.29 cu. in.	1 — K. Morrissey		157.10
3	— G. Isles	151.67		2 — D. Roberts		156.33
4	— D. McGladdery	149.04		3 — D. Miles		140.78

Another Sharston 'big name' made a welcome appearance this year — Gordon Isles, apparently sorely provoked by the very recent loss of his long-held UK FAI record of 157.65, attempted retaliation but fell short at 151.67 mph . . . probably a reflection of the very high level of endeavour and continual practice necessary in this so demanding class of speed C/L flying.

Very similar to Gordon's dilemma was Mike Billinton's attempted 'defense and recovery' of the 10cc record. After 2½ days unavailing effort this dissolved into metaphoric and then literal ashes as the 4-year old model suffered another rather over-lean hot run — summoning up rare use of fire-extinguisher — following which respectful last rites were played out over the remnants. 'Phoenix or Bust' seems to be the only motto relevant here.

At 10th place Sharston's Pete Grange placed much higher than in 1983 with his *K&B* 40 now travelling at a much higher 162 mph to only trail slightly behind the more experienced Dick Miles whose 168 mph was itself not far short of the 1983 Paige/Radcliffe record 172.74.

The friendly low-key organisation owed much to Speed Committee Chairman Dick McGladdery who gained ready co-operation of fliers in the undertaking of their various stints of Timekeeping/Marshalling etc. Additionally above the call of duty was the extra help of Dick and 'Babs' Roberts, Carl Jones, Jo Halman and Bob Gibbs.

Viewing Paul Eisner's dizzying 47 RPM as pilot and winner of the Open 15 class gave added contrast to the gentle humour of Ray Cox's remark (reflecting on his lowly 15th placing) that 'this was a Nationals where it was possible once again to seek out familiar faces around the circle whilst flying! In fact pilot rotation rarely strays outside 1¼ to 2 secs. per lap, so Ray wasn't going that slowly!

ENGINE TEST

Mike Billinton runs-in his new mini Dynamometer with the latest small British diesel.

Above; PAW 100 shown with standard spraybar fitted. R/C throttle carb is optional.

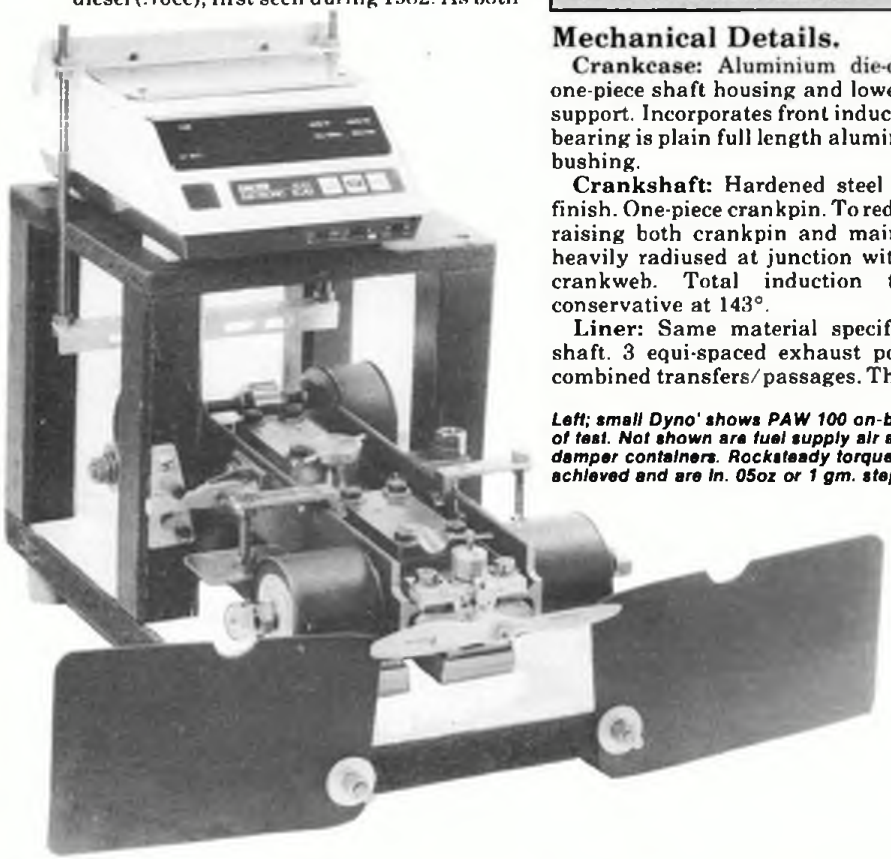
MUCH of the early stages of this engine test were conducted in tandem with final developments of a new 'small-engine' dynamometer (more accurately — a Torque meter), constructed in the main by the writer's son Daniel, who showed considerable flair for the necessary machining work. As the 'dyno' is virtually a quarter size replica of the much larger heavyweight machine normally used for engines above 2cc, design time was consequently minimised.

The *PAW* 100 probably benefitted from this exercise in that it was given ideal running-in conditions — with many starts and short (medium to high speed) runs being continually undertaken — as much to verify the dynamometer's progress as the engine's performance.

In sharp contrast to the test equipment, *PAW* engines are of much longer lineage and their enviable reputation as 'value for money' machines has been widely acknowledged since their inception in 1957, following some years limited production of 'Eifflaender Specials' from the end of WW2. Allied to low-cost, their solid no-nonsense construction and reliable high performance has, over the years, maintained for them a highly individual niche in the model-engine field.

The diminutive '100' two-stroke diesel tested here (nominally 1 cc but measures out to .92 cc) was first released in 1983 and is essentially a bored-out version of the '80' diesel (.76cc), first seen during 1982. As both the '80' and the '100' are available with either an R/C throttle carburettor or plain spraybar, the consequent field of operation is wide...'sports' aircraft use will most suit these small diesels and propeller sizes are within reason totally non-critical because of the diesels very wide, flat Torque band, itself a direct consequence of the adjustable 'ignition point' afforded by the variable compression. By comparison to the less flexible glow plug engine, propeller sizes become a matter almost of personal preference rather than a dictate of motor design.

Cylinder liner shows internally milled transfer ports. Crankshaft is strengthened by incorporation of prop driver taper collet into crank structure.



Left; small Dyno' shows PAW 100 on-board at end of test. Not shown are fuel supply air and oil damper containers. Rocksteady torque readings achieved and are in. 05oz or 1 gm. steps.

Mechanical Details.

Crankcase: Aluminium die-casting — one-piece shaft housing and lower cylinder support. Incorporates front induction. Main bearing is plain full length aluminium alloy bushing.

Crankshaft: Hardened steel — ground finish. One-piece crankpin. To reduce stress-raising both crankpin and mainshaft are heavily radiused at junction with full-disc crankweb. Total induction timing is conservative at 143°.

Liner: Same material specification as shaft. 3 equi-spaced exhaust ports and 3 combined transfers/passages. The '80' liner is used but is here bored out approximately .037in. leading to stroke/bore ratio of .845/1. Exhaust timing is a quite low 140° having a small lead over transfers of only 5°.

Piston: Spheroidal grey iron. Ground and lapped finish with liner.

Connecting-rod: High-duty aluminium alloy HE15 (1.65 of old.) Unbushed at either end — no lubrication holes either. The diesel's extreme abundance of lubricating oil makes more refined rod bearing details less necessary, particularly with the low inertia of these small moving parts.

Contra-piston: Also cast iron. Combustion chamber shape is similar to most modern glow engines — a flat annular squish band surrounding a central 'top-hat' chamber.

Power tests.

Fuel — *Model Technics D-2000;* Plain spray-bar choke. As stated, running-in was more intensive than usual, during which flat-out RPM figures from 6,000 to 17,000 were recorded. To advance the effective ignition timing for the higher RPM's, increases of compression ratio were required as expected. The writer's curiousity led to a mechanical estimate of the squish

clearance/combustion volume changes occurring at two RPM points, with following results:-

RPM	8,500	15,000
Comb.vol.	.055 cc.	.046 cc.
Squish	.010in	.0065in
Geometric comp. ratio	17.8:1	21:1
Effective comp ratio	14.6:1	17:1

The indication seems to be that some modern high-compression glow plug engines are almost at the point of operational capability as pure diesels. (OPS 60 R/C SLA is 17:1 Geometric).

Torque tests were commenced at 6,200 RPM and maximum Torque of 8.1oz. in. appeared at 7,284 RPM. Continual optimising of compression and fuel settings at each of the reducing load points resulted in the model diesels characteristically flat Torque curve. Final decline only became marked after 19,000 RPM area, almost certainly due to restricted breathing. A maximum BHP of 0.12 at 18,200 RPM was a quite vivid affair — unlikely to be used by majority of sports users. The fact of a relatively heavy robust piston and lack of crankweb counterbalancing leads in any case to increasing vibration as RPM's rise in this area. Even so the *PAW* '100' continued rotating happily at the last RPM point chosen — 21,640, and where .103 BHP was still being churned out.

Other information points:

1. Hand-starting was used almost exclusively, seeming as effective as mechanical methods. Even the *Cox* 5½ x 4 propellor though worryingly small, allowed easy starting — given correct setting and a positive flick. For those less certain in their approach to the diesel's high compression ratio, a protected finger or 'chicken stick' is a commonsense precaution, though as one becomes more organised as to settings etc. these are less necessary.

A 7 x 4in propellor is a good compromise size for ease of starting/reasonable power/most sports use.

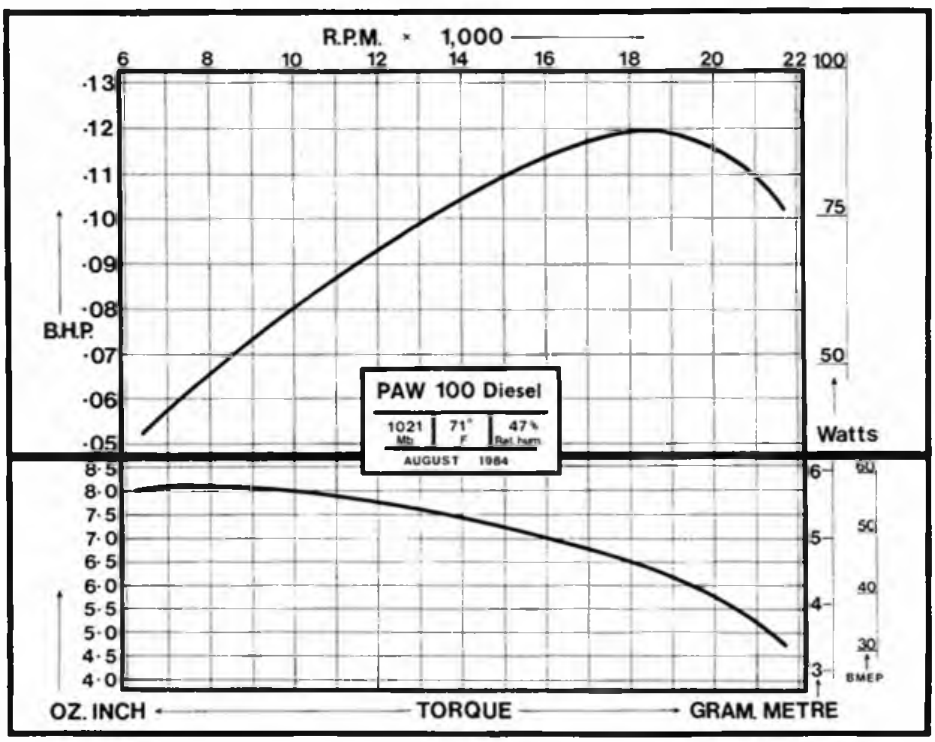
2. Fuel setting for starting from cold or hot was around 1 turn richer than best running setting. Compression usually needing to be increased by up to ¾ turn past the running setting, though hot restarts can be obtained with the running setting or even reduced a little below that point.

3. Final adjustment of the fuel needle valve clearly gives an RPM advantage but stability of motor running on occasion was slightly impaired (as with any engine running on the lean limit). So, more certain operation resulted from a slight richening of the needle valve by some ¼ turn.

4. Check the 3 cylinder screws for tightness during the first runs.

5. Above 16,000 RPM the compression adjustment screw sometimes self-rotated — thus reducing compression. To complete the tests a 2BA lock nut was therefore fitted. This may have been caused by interaction of the engine with the unusually rigid solid metal 'dyno' — and may well not occur in normal model use, and is very unlikely at the usual RPM's below 14,000 RPM. Initially the fuel needle also 'floated' at high RPM end, but this was easily cured by further squeezing of the slotted needle barrel.

6. Manufactures advise against disassembly of these small engines once run-in. Reassembly, even to previous location marks, can result in slightly reduced performance.



Summary

In recent years the writer's experience of the small diesel engine has been quite limited compared with larger exotic motors in the glow/spark ignition class, and it was chastening that as much, if not more, care and attention was needed to arrive at a meaningful test result. What did waft back from earlier times was the delightful controllability afforded by variable compression — so much so that one increasingly doubts just what is going on inside the average glow engine as regards correct ignition timing in relation to RPM!

The *PAW* '100' had all the remembered attractions of the model diesel and proved remarkably resilient. The end of the test session was reached with motor unscathed, even after some occasional rough treatment on the 'over-compressed' front — apparently the unit has considerable 'anti-user' safety factors already built-in!

PAW 100 Diesel.

Dimensions & Weights

Capacity — .0561 cu. in. (.92 cc.)
Bore — .439 in. (11.15 mm.)
Stroke — .371 in. (9.42 mm.)
Stroke/Bore ratio — .845:1
Timing periods — Exhaust — 140°
Transfer — 130°
Front Induction —
Opens — 62°
Closes — 25° ATDC
Total — 143
Exhaust port height — .070 in.
Combustion chamber vol.) See text
Squish clearance) See text
Compression ratios)
Squish band width — 2.2mm.
Squish band angle — 0°
Crankshaft dia. — .2813 in. (9/32 in.) (7.14mm)
Crankpin dia. — .1545 in. (5/32 in) (3.92mm)
Crank bore — .180 in (11/64 in) (4.57mm)
Crank nose thread — .183 in. x 31.4 TPI (2BA)
Gudgeon pin dia. — .1093 in. (7/64) (2.77 mm)
Weight overall — 2.4ozs. (.068 Kilo)
Piston weight — .10 oz. (3 gms)
Mounting holes — 24mm x 11.5mm x 2mm holes.
Width between bearers — 19mm.
Width — 1.16 in. (29mm)
Length — 1.85 in. (47mm)
Height — 1.87in (47mm)
Frontal area — 1.37 sq. in.

Performance

Max. BHP — .12 at 18,200 RPM
Max. Torque — 8.1oz. ins. at 7,284 RPM
R.P.M. Standard propellers:
8 x 6 Zinger — 6,668
8 x 4 Zinger — 8,570
7 x 6 Zinger — 8,645
7 x 6 Topflite — 8,713
7 x 4 Master — 10,820
6 x 3 Master — 16,150
5½ x 4 Cox — 17,000

Performance Equivalents

BHP/cu. in. — 2.14
BHP/cc. — .13
Oz. in./cu. in. — 144
Ox.in./cc. — 8.8
Gm. metre/cc. — 6.28
BHP/lb — .80
BHP/Kilo — 1.76
BHP/sq.in. frontal area — .087

Manufacturer

Progress Aero Works,
Park Mill,
Hobson Street,
Macclesfield,
SK11 8BE.

This 'Harrier' was born when the idea of a realistic scale-like trainer arose among my school model group. It borrowed the idea of being held together with rubber bands from the A.P.S. 'Bouncer' (C/L 808). The most important thing was that the model must be strong, to avoid breaking when those crashes, that are always part of learning to fly, suddenly end a flight. The first idea was to hold the wings and the tail assembly onto the fuselage with rubber bands. In a crash it is the sudden stop that causes the damage. If wing and tail can carry on moving, by stretching or breaking rubber bands, everything is much less likely to break.

Profile fuselage models make good trainers, simple and quick to make even the semi-scale form like the "Harrier".

Below; rubber band fixing for wings and tail make this model even more resilient than most control-line trainers.

HARRIER! control-line trainer

Why build a barge when a control-line trainer can look like a real aeroplane? R.A. Williams has designed this one for 1.5cc motors.

The second idea to make the model tough was to edge both the wing and the tail assembly with nylon cord. This prevents splitting at the ends and also stops chunks being knocked out of the leading (front) and trailing (back) edges of the wing or tail.

The ultimate step in making the model tough is to cover the entire model with *Solartex*. This is not easy for a newcomer to aeromodelling, is rather expensive and adds weight. It does, however, make the model extremely "crashproof". It is an idea you may follow up but the plan details the lighter and for the newcomer, easier method of tissue and dope.

It would not be possible to build a 'Harrier' for control line training purposes to exact scale size. The wing is much too small. So in this 'Harrier', the fuselage, wing and tail assembly are all to scale but each is a different scale! By doing this the look of the model is "right", but at the same time the needs of model aerodynamics have ben met.

Study the plan and sort out in your mind how the pieces fit together. To help you, there are a number of diagrams and sketches . . . Study these well. It cannot be said too often that you will have fewer problems if you have a good careful "thinking it through" period before you actually start. So, link the skeleton and the plan together BEFORE you start work. I have helped dozens of beginners to successful control line flying,and they agree that the above advice works. Follow it . . .

Construction

The tools and equipment you will need to have on hand are listed, with the building material you require, at the end of the article.

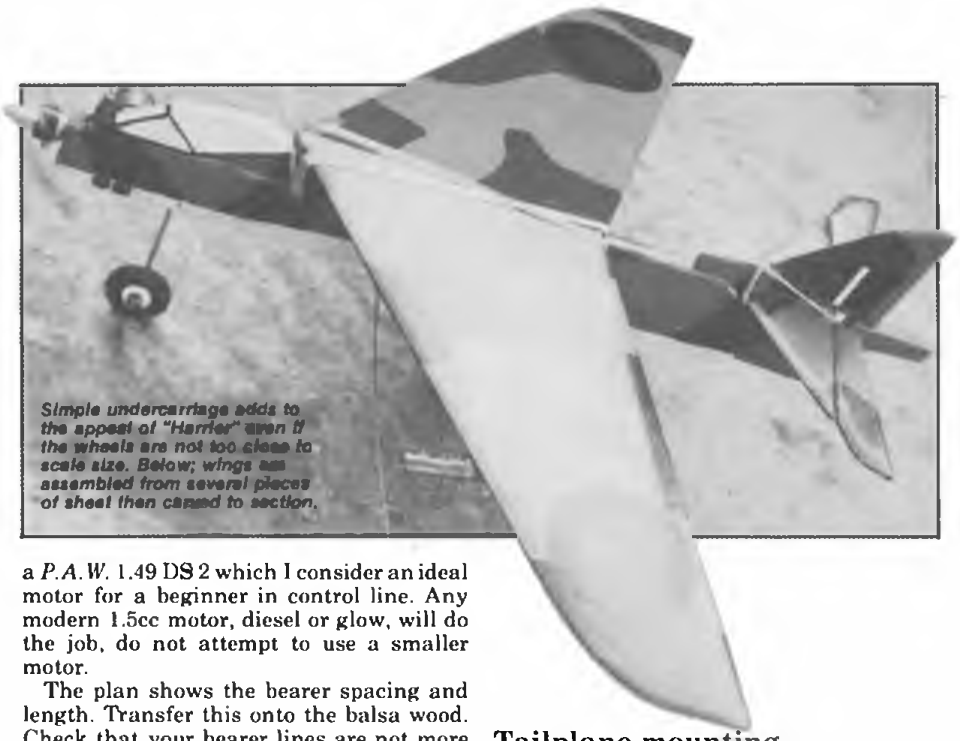
Wing

The wing is the place to start. The plan gives you the shape and how to transfer this to the balsa. The plan shows how the three inch wide $^{3}/_{16}$ in. thick balsa is cut and glued to make each wing half. Because the wing has a sweep back and slopes downwards from the middle (anhedral), it has to be made in halves. To join the wing halves together, use 5 minute epoxy glue. To form the anhedral, the middle needs to be held up about 1in. The easiest way to do this is a piece of 1in. square timber.

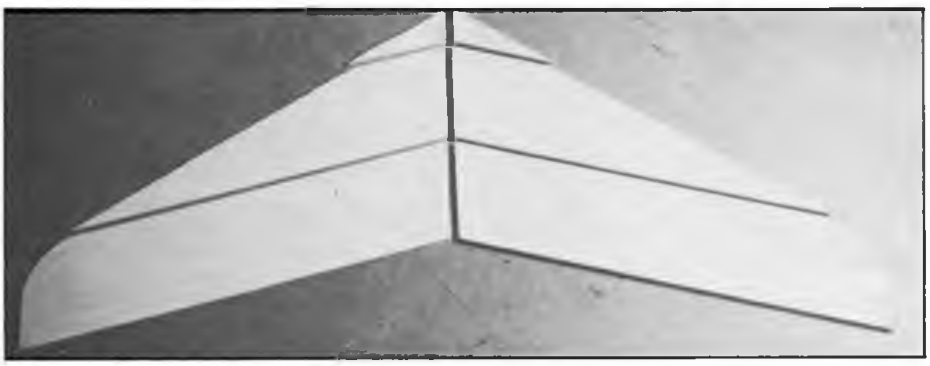
The amount of propping up is not critical as long as it is about 1 in. The piece for the job needs to be as long as the wing is wide in the middle. Remember that the square ends of the wing halves will not meet neatly. Carefully sand a little from the bottom edges to get a better fit, be warned, it is easy to take too much off. After the 5 minute epoxy is dry, find some old sheeting or other cotton cloth and spread PVA glue onto two 1 in. wide $7^{1}/_{2}$ in. long strip. Rub the glue

into the cloth until it is wet with glue, then stick it on over the top of the join line for the wing halves. This is the shaded area on the plan. Do the bottom first, cutting off the small ovelap. Then do the top and fold it over and around the underneath to get a neat finish. It is a bit messy but leave it off and you risk the wing halving itself in a crash. Now glue the nylon cord around the edges as shown. I prefer to use balsa cement for this task. Sand as needed to get a smooth blend between balsa and nylon cord. Now cut a shallow groove in the outer wing tip and epoxy in the tip-weight as shown on the plan.

The next step is to give the entire wing a coat of dope, sanding when dry, then repeat this step. Cut 4 panels of tissue. White, lightweight is best, your model shop may only have medium or heavy. This is OK but not so easy to use. Two of the four panels are cut to exact size of each wing half. These are for the bottom side of the wing. The other two are cut about ½ in. bigger all round. They are for the top of the wing. Once they are cut they can be doped onto the wing. Do the bottom first. Dope the wing, lay the tissue on quickly but make sure it is in place and rub it into the dope to ensure a good grip. Once the tissue is smoothed out dope over the top, working it into the tissue. Repeat the whole process with the top panels. You may have to snip the edges a little at the tips to prevent creasing. If the edges you fold underneath prove hard to stick down, give them a dose of balsa cement along with the dope and smooth them with a finger. The wing now needs as many coats of dope as it takes to make it look shiny, probably two or three coats. Now fix the two small dowel pegs that are needed to prevent the holding bands slipping down the sweep-back of the wings. Use balsa cement. (See plan).



Simple undercarriage adds to the appeal of "Harrier" even if the wheels are not too close to scale size. Below; wings are assembled from several pieces of sheet then carved to section.



If you are wondering why there is no mention of carving and sanding the wings to section . . . It is not necessary. This model is only intended to go round and round. Experts will disagree but I have found little to be gained by all that sanding and carving, especially for an inexperienced modeller working with the most basic tools.

Fuselage

Transfer the shape of the fuselage to the balsa wood. Use ½ in. x 3 in. balsa. Make sure it is firm strong wood, rather than soft light wood. If you elect to do the GR3 version (more about the versions can be found in the painting section) you will be able to fit the entire fuselage onto the 3 in. width, but if you do the 'Sea Harrier' you will need to add an extra piece of balsa onto the 3 in. sheet in the area of the cockpit.

Cut the fuselage out, using a coping saw and lots of care. The next step is to fit the engine bearers. The drawings are spaced for a *P.A.W.* 1.49 DS 2 which I consider an ideal motor for a beginner in control line. Any modern 1.5cc motor, diesel or glow, will do the job, do not attempt to use a smaller motor.

The plan shows the bearer spacing and length. Transfer this onto the balsa wood. Check that your bearer lines are not more than ⅞ in. apart and that the bearers are exactly ⅜ in. wide and 4 in. long. The piece you cut our for the motor is 2in. long. Use a sharp, fine tooth saw for this as the cuts need to be straight and true. The short cross cuts at the end of the bearer slots and the engine bay should be done with a coping saw. Cut the bearers and glue them into place. Use epoxy or PVA glue. Next step is to cut the 1 mm. plywood doublers for the nose. They are shaded with wavy lines on the plan. The best glue for these is *Evostick* impact glue but younger modellers may have to get an adult to buy it for them. Before applying the glue, practise laying the plywood exactly in place, for once the glue is on, it is extremely difficult to remove the plywood if you don't get it right! If your nerve fails, use PVA but do make sure the plywood does not curl up at the edges. One of the plywood doublers will need the engine bay cut out, the other does not. Don't fit the engine yet. It is much better to do that after the model is painted and fuel-proofed. Do not forget to put in the little bit of plywood in the end of the engine bay.

Now mount the bellcrank . . . First, cut out the hole using your fuselage tracing. The plywood doublers help you to get the position right. Drill a ¼ in. hole in the middle of the piece that will be cut out and use your coping saw to cut out the hole.

The hole is now lined up, bottom and each end with 1mm plywood. This plywood provides, top and bottom, the hard surface needed to hold the bellcrank mounting bolt. Don't fit the bellcrank yet, or you will never get the inside of the hole painted or fuel proofed!

Tailplane mounting

Cut out the recess for the tailplane mounting with the coping saw, taking care that the ½ in. wide, 3/16 in. deep slots for the tailplane supports are accurate. The curved part of the cut out is only approximate, and you may have to cut away some more to get proper elevator action. The tailplane supports are made from ⅛ in. balsa ½ in. wide, 1in. long, with 1mm. plywood glued onto both sides to make them stiff. Do not glue them in yet, for they will be in the way of work yet to be done. Take note of the tailplane stop, made from two ½ in. wide, ¾ in. long pieces of 1 mm. ply glued together. It needs a little slot at the bottom of the elevator recess. It is fitted to stop the tailplane sliding back too far and affecting the elevator control.

Cut and fit the 3/16in. balsa sub-fin. Sand the fuselage to get a smooth join between the two parts. Do this after the glue is well dried. To help prevent the rear projection of the fuselage from being broken off, glue a length of 3/16 in. dowel on the underside. Drill a ½ in. deep hole into the fuselage and push the dowel in with PVA glue on it. Strap it up to the fuselage projection with a rubber band until dry.

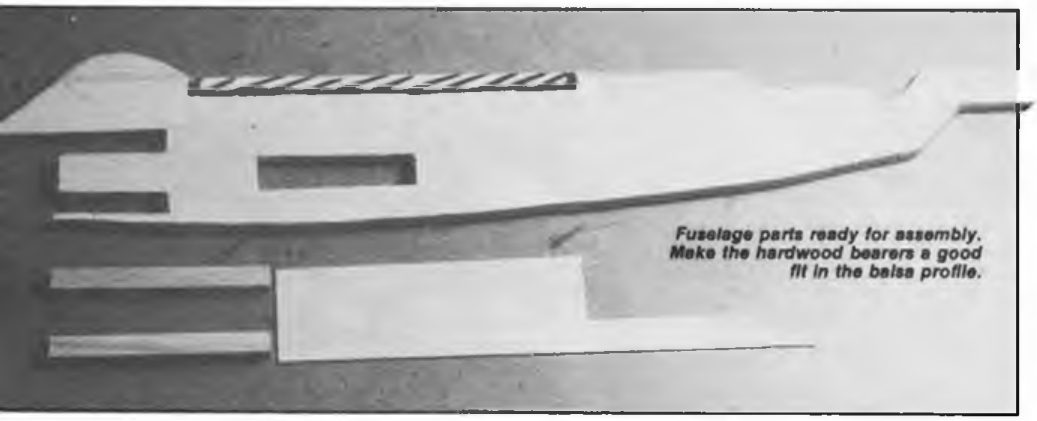
Tailplane, Elevator and Fin

Trace the shapes from the plan, transfer and cut from the ⅛ in. balsa sheet. Edge all with the cord, as for the wing, but do not do the hinge line of the tailplane and elevators or the base of the fin. Join the elevators together as shown on the plan, using ⅛ in. dowel and epoxy glue. Glue the fin to the tailplane with the same glue. It is a good idea to put extra glue along this join line on each side to give strength to the joint. This is called a "fillet" of glue. Cover the tail assembly with tissue, as described in the wing instructions. Do not hinge the elevators on until after painting the tail assembly.

Wing platform

This is made from ⅛ in. balsa glued to make a ¼ in. thick platform. First, cut the two pieces, 'A' and 'B', with the grain running lengthwise. Take the finished wing and some clingfilm. Lay the wing upside down on the bench and spread the clingfilm over the middle part of the wing. Now fit the two

platform pieces into the shallow 'V' formed by the upside-down wing. By using the wing as a jig, we make sure the angle of the 'V' is correct. Trim the edges where they touch to get a neat fit, apply PVA or 5 minute epoxy and pin firmly into place. Leave until dry. (The pin holes in the wing shoud be sealed later with balsa cement). While this piece is drying, make up piece 'C' with the grain running crosswise. When dry, mark the middle line as shown on the plan. Then score heavily along this line. Use a small screwdriver, edge on, or a 3in or 4in. nail. Using a ruler, pretend you are trying to cut the wood. Make a single heavy stroke. By placing the score line along the bench edge and pressing carefully, crack the balsa to form a shallow 'V'. This can then be fitted over the other piece formed on the wing, to make the ¼in. thick wing platform. Use PVC glue and plenty of pins. Do not forget to remove 'A' and 'B' from the wing BEFORE glueing to 'C'. After the glue is dry trim the edges to make them neat.



Fuselage parts ready for assembly. Make the hardwood bearers a good fit in the balsa profile.

The top of the fuselage now needs to be recessed to fit the platform. To get the inverted 'V' shape needed, trim and sand carefully. Keep testing with the platform to check how good the fit is. When you are satisfied, it can be glued into place with PVA or epoxy. Hold the model so you are looking at it straight from the front. Adjust the wing platform until all looks even. Leave to dry. Now is a good time to cut the control handle from some ⅛ in. or 3/16 in. plywood. An offcut from your local DIY shop is a good source of supply. The shape is shown on the plan. The handlie is adjustable by passing the wire under the big washer held by the 6 BA bolt. When the bolt is loose, the wire can slide back and forth. Screw the bolt up tight, and the wire is clamped down unable to move. Paint it a bright colour like red, orange or yellow.

Finally

Install the tailplane mounting supports, and the dowel pegs for hooking the wing and tail holding rubber band over. The tailplane supports are already made (I hope) but before glueing them in, drill the 3/16 in. holes for the dowels, positioned as shown on the plan. The dowels are 1½ in. long. Glue them and the supports in, making sure they are all at right angles to the fuselage. Did you drill the holes at right-angles?

The entire fuselage can now be covered with tissue, as were the wing and tail assembly.

Finally, make up the flying line guide, better known as the lead-out guide. I made mine from a section of a wooden school ruler. The wood is usually tough and straight grained. Glue it to the doped but unpainted wing with balsa cement. Precement both wing and guide before finally glueing into place. A bad crash may break it free. If so, just glue back into place. The plan has details of bending the wire guides. To fit the wire, drill two 1/16in. holes as shown on the plan. Bend the wire to the shape shown but *without* the loops in the ends stage 1). Fit this through the holes in the guide. Using needle-nosed pliers, bend loops as shown in stage 2. Each side of the loop is about ¼ in. Epoxy this wire into position, making sure the glue gets down into the 1/16 in. holes to prevent the wire from wobbling.

Painting

We have now reached the point where we can begin to think about painting the model. This is the part that can make or ruin the looks of the model. (But it will still fly..Ed). Care, attention to detail and the determination to do a good job, are all essential. The GR3 version has a three colour camouflage paint scheme. The "Sea Harrier" is two colours: grey above, off-white below. This simple scheme is easier to do, so that may influence your choice. I have not detailed paint schemes on the plan because I feel it is much better if you can find a good colour photo to copy. Such photos can be found in aircraft books in the local library, or bookshop, or in aviation magazines. Also, cheap plastic kits always detail accurate colour schemes.

Paint is heavy, so use it carefully. If you are doing the 'Sea Harrier', spray aerosols are quick and keep the weight down. *Humbrol* do some very good ones, also your local DIY motorist shop may have a wide range. The cockpit area, with black lines for the frame, should be hand painted. The frame-lines can be done with a black marker pen but the fuel proofer may cause them to run. So, fuel-proof with several light coats rather than one heavy coat. The GR3 version, with its grey and green camouflage scheme, is not quite so easy but the plan shows a simple method to achieve a good camouflage scheme.

Another thought is that college art departments are now investing in airbrushes of high quality. . .When the painting is finished, find some suitable transfers of roundels and colour flashes, etc. Apply them onto the newly dry paint.

Controls

Now hinge the elevators. The plan has details of both sewn and tape hinges. Sewn are more free-moving but be sure to use strong thread, or mono-filament fishing nylon. The best tape I have used for hinges is 1cm. wide nylon ribbon from a sewing supply shop. After hinging, repair with care any damage to the paint scheme. Take great care not to get paint or fuel proofer down into the hinge gap. It gums up the hinge line and stops smooth working. Fuel proofer can be applied after all painting, hinging, transfer applying, etc., is complete. You can brush it on, or use *Humbrol's* excellent spray-on proofer. Let all the paint work dry thoroughly before continuing.

The bellcrank is mounted by drilling a 3/32in. hole up from the bottom side of the fuselage, exactly in the middle of the bellcrank cut-out. Remember, the hole is 1½in. deep, passing out the top of the cut out. Screw a 6BA bolt into the hole, in which it is a firm fit, until the tip appears in the cut-out bay. Fit two washers and the bellcrank and screw the bolt right home. Put a blob of 5 minute epoxy over the head to prevent it working loose.

Next step is to fix the moulded control horn onto the elevator in the position shown on the plan. Attach the tail assembly with rubber bands that are a tight stretch between the dowels. Make sure the tail assembly is seated back against its stop and the elevators are firmly held in neutral: Use a bulldog clip to 'clamp' elevator in neutral (horizontal). Pin the bell-crank in the neutral position, i.e. its straight side parallel with the fuselage sides. Using 16swg. wire, make up your pushrod. Bend the ends as shown. Bend up one end first using your needle-nosed pliers. Fit it into the bellcrank. Put the wire up against hole in the horn as shown. Bend, and cut off surplus. Now take tail assembly off, fit push-rod and refit assembly to fuselage. If neutral elevator is not obtained when bellcrank is in neutral, study where the elevators are. If they are down, pushrod is too short. If up, pushrod is too long. You can now do one of two things. One, is to start again with a new piece of wire. Another, is to cut the pushrod, removing an inch or so in the middle. Replace this with brass tubing about 2in. long, sliding the wire inside the tube. When all is adjusted to neutral, carefully solder the tube and wire at each end of the tube. Don't despair, just think of Robert the Bruce and his spider!

Engine and tank

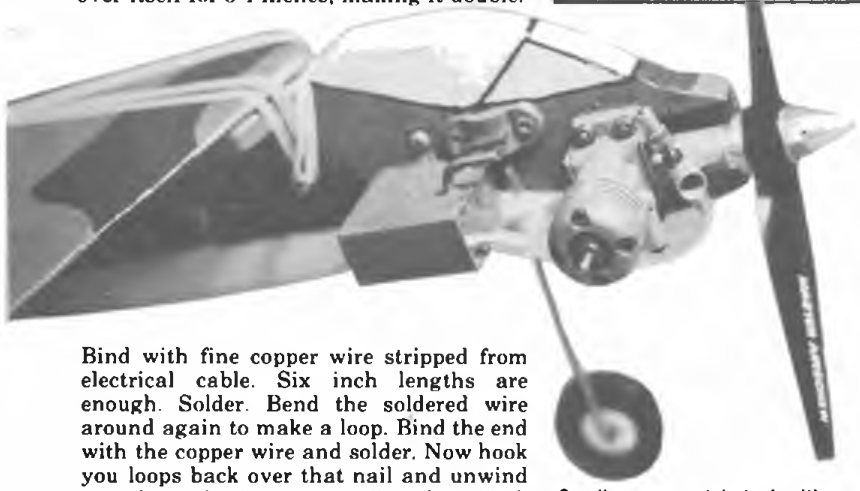
Now one of the more simple tasks!! The engine is mounted by making sure it fits in snugly, with the rear of the motor pushed up against the end of the engine cut-out. Using a marker that will fit the 6BA holes of the engine (a sharpened nail is fine), mark the

Tailplane, fin and elevators are fixed to the fuselage with rubber bands.

holes to be drilled. Drill with a ⅛in. bit. I always have the head of the bolt on the engine and the nut and washer out the other side. This allows you to get a spanner on the nut and to screw it up tight. Forget the old tale about soldering wire across the heads. Do the nut up tight and it won't move. Cut and file off any projecting thread. To mount the tank, drill holes as shown on the plan to take a 6BA bolt. Cut a length of plastic fuel tube that is ½in. *too short* to go right around the tank. Screw the 6BA bolts into each end and wind the whole assembly up tight. It is not rock solid, but it won't ever come free. Fit a plastic fuel tube. Before we can fly, we need to make up the flying lines.

Lines

Take your 70ft. reel of wire. Find a place to hook the wire over that it can also run around — such as a washing line post. Hold the free end in one hand and the reel in the other and walk backwards, until it is all unrolled and you have got two 35 foot wires in front of you. Tape the two ends onto a cocoa type tin, to one side, so you can get at the ends later. Roll the lines onto the tin. When you reach the post you are faced with a 'U' of wire that must be cut. Use a good pair of side cutters, for this wire is tough! You will need a rubber band around the tin to stop the wire unrolling. The tin can be used to store the lines after completion. To make loops in the end, fold the wire back over itself for 3-4 inches, making it double.



Bind with fine copper wire stripped from electrical cable. Six inch lengths are enough. Solder. Bend the soldered wire around again to make a loop. Bind the end with the copper wire and solder. Now hook you loops back over that nail and unwind your loops back over a nail and unwind to 30 feet. Exactly 30 feet, for uneven lines will give you problems come flying time. Use the surplus wire to make up the wire in the handle. Make the loops the same way. Now make up the bellcrank ends of the flying wires. Bend and cut two connectors as detailed on the plan. The flying wire overlaps the connector by 1½in. Mark this point on the connector. Pin the connector and wire side by side on a scrap of balsa. Solder together, then bind with fine copper wire and solder again. Use Bakers Soldering Flux, NOT resin-cored solder and clean the wire with steel wool before soldering. If you have been careful, these lines should be exactly equal. If you are within ¼in. that's OK. Your handle can cope with 1in. of unevenness but you have been careless if you get that much. To connect the lines to the handle, go to a fishing shop and get a pair of swivel connectors. Cut the swivel off and use the connector! To fit the other end into the bellcrank attach the wing with 4 strong bands going from right front to left rear, and left front to right rear, and feed the lines through the the lead-out guide, fitting the connectors into the bellcrank from the underneath side. Adjust at the handle to get neutral at the handle, bellcrank and elevators. Check that up is *up* and down is *down*. You may like to colour the ends of the up line and the up side of the bellcrank, say red, so you know where to put the line without having to double-check all the time.

Flying

The model can now be flown, using a hand launch, but do add lead to the tail as needed to get the balance point right. Glue it on with epoxy and paint over it. Don't ever attempt fly on low power to "slow things down". Yes, it does slow things down, but also looses line tension and causes control problems. Get that *PAW* 1.49 really humming and keep on trying. To hand launch, hold the model by the wing tips in front of you, in the same sort of position you would carry a box of groceries. Point the nose up a little and slightly 'out' of the circle. Take 2 or 3 big swift steps and sweep your arms up and out in a grand two-arm wave. Don't jerk the lines but do keep running as you sweep your arms up and away and carry on running after you let the model go. You'll probably make a mess of it the first few times and get plenty of aggravation from the pilot! If/when you are the pilot, stay calm and try again.

If you feel more confident using a take-off run on wheels, a drop-off undercarriage is shown. The prototype used a scale-like, fixed undercarriage but it was too long, too heavy, and caused the model to tumble on "landing". With no undercarriage the model looks better in the air and slides in on its belly for a landing. The 'drop-off' undercarriage makes no pretence at scale appearance. The 'Harrier' sits up in a most un-Harrier like manner, resting on the sub fin. This is why the fin has a wire skid epoxied to it. The screw eyes used are the pilot holes into the engine bearers before pilot holes into the engineer bearers before fitting the eyes. The prongs on the undercarriage fit up through the eyes. You may need to bend the wire and/or adjust the eyes to get the wire prongs and the eyes to line up neatly. As long as the weight of the model sits on the undercarriage, it stays in place. As soon as the model is airborne, the undercarriage falls off.

Do not expect world-shattering flying from the 'Harrier'. It takes off and goes round and round and plops down when the motor stops. That's all it is expected to do. Remember, this model is designed for the newcomer to control line flying. It is tough, and as easy to fly as it is possible to make a model. I think it has the bonus of looking good and being a plane of today.

Finally, go to your local library and get a copy of Ron Moulton's Control line Manual. It was published by M.A.P. and you may have to ask for it on interloan. Read it all, for no better book on control line has been written. This book will answer all your questions.

In parting, I make an offer I have not seen in *Aeromodeller* before. It is this. If some aspect of this project puzzles you, you can contact me at 082-83-2833, after 8 p.m. Good flying!

Small pressure style tank with mounting brackets soldered on fixed to fuselage with woodscrews.

TOOLS

Stanley Knife with new blade
Coping Saw
Tenon Saw
Hacksaw
Screwdriver
Small Spanner
Needle-Nosed Pliers
Drill, with 1/16in, 5/64in, 3/32in and ⅛in bits
Sandpaper medium and fine
Soldering Iron 75 watt or gas fired with copper bit
DIY plumbing solder
Bakers Soldering Flux Liquid not paste
100s of pins
Spring paper clip

List of Materials for Harrier

1/16 x 3 x 36 Balsa 1
3/16 3 x 36 Balsa 2
1/16 x 3 x 36 Balsa 1
⅛ x ½ x 12 Beech Bearer 1
1mm. Plywood 6 x 12 minimum
3/16 x 36 Dowel
scrap of ¼in dowel — about 2in.
2 x 22swg.)
1 x 16swg.) Wire. All 36in
1 x 14swg.)
Scrap ¼in. plywood for handle.
2in. Bellcrank 1
Propeller 7in x 6in 1
Tank 20cc. 1
Bolts 2 x packs of four 6BA
Lines 70ft. lightweight Laystrate
Control Horn RC Plastic type
Fuel Tube 12in plastic
Wheels 2 x 2in or so RC balloon type
Tissue 2 sheets white
Spare 6BA washers
Rubber Bands PO type
Pins from old electrical plugs
6ins of electrical cable
Strong thread or nylon tape
Fishing swivel connectors
Large washer for handle
Nylon cord ¼ diameter 9 feet or more
Cotton sheet 8 x 4ins
Dope Humbrol No 4
Thinners for dope
PVA, Balsa Cement, 5 min epoxy glues
Paint See painting section

FROM THE HANDLE

CONTROL LINE NEWS

The F.M.V. Story — continued

The *F.M.V.* (Flores — Metkemeyer — Visser) engine has been one of the most successful "home-made" engines of the last six years having won the 1978 World Championships, 1979 and 1981 European Championships plus many of the main FAI 'Open' meetings. Amongst the main features of the original engine were low weight, compact external dimensions and the use of a separate steel housing for the shaft bearings. Most of this has changed in the MK II version, which is now nicknamed "The Monster" on account of it large size.

The growth in the external size of the engine is mostly explained by the following design changes:

a. a hollow shaft with a main diameter of 15 m.m. The crankpin is 8 m.m. in diameter.
b. a rear race of 15 x 28 m.m. Front race is 10 x 19 m.m.
c. deep cylinder fins of 30 m.m. outside diameter, with a depth of 6 m.m.
d. con-rod and crankshaft are made in bearing grade steel (100 C 6).
e. the steel con-rod carried a needle roller bearing in the big end journal. Note also that the rear of the intake drum is supported by a ball bearing.
f. the cylinder line is of the now familiar integrally finned variety, with separate push-pull cylinder head. Rob is experimenting with some new materials for the liner. The current version is using *Rolls-Royce* 350 as this is more stable at high temperatures than *Mahle* 124.

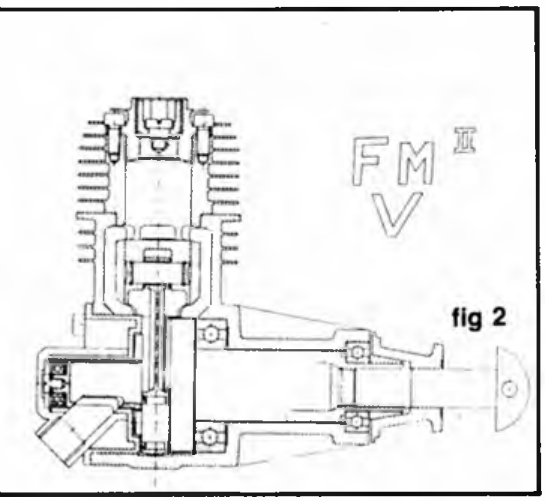


fig 2

Neat ideas

It is easily forgotten that the vast majority of control line fliers never enter competitions and therefore don't see many of the minor innovations used and proved "in combat".

One such idea that seems to be rapidly gaining acceptance is the use of a 3 amp electrical connector (usually sold as a strip of a dozen or more) to fasten the push rod to the elevator horn (fig 1). This gives the facility of infinite and instant adjustment to the elevator neutral.

The brass connector is cut out of the plastic and a slotted cheese head 6 BA screw substituted for the existing grub screw. The push rod goes through the "cable" hole while the 6 BA passes through the horn into the connector and clamps on the push rod (bicycle spoke). A drop of *Loctite* on the thread gives extra security (if you haven't any *Loctite* try *Evostik* 'Contact Adhesive'). Note! Some electrical connectors have more metal around the cable hole which stops them splitting so shop around for these.

Another idea which is used by Mark Jarrett of Peterborough M.F.C., is a modification to a standard *D.C.* metal control line handle (fig 2) to give a quick line adjustment (of neutral) over several inches, e.g. when a broken line is knotted in the course of a bout!

The adjusting rod and knurled nut are removed and the adjusting rod hole bushed with a short length of tube. The adjusting rod is re-used by shortening it and drilling a hole at the end of the threaded portion. The handle is then drilled vertically down through the hand grip (this is best done on a pillar drill) and another hole horizontally from the down line connection point. Finally a new hole is drilled for the adjuster and a length of Bowden cable passed through the drilled holes and modified adjuster as shown. The re-used knurled nut clamps the Bowden cable.

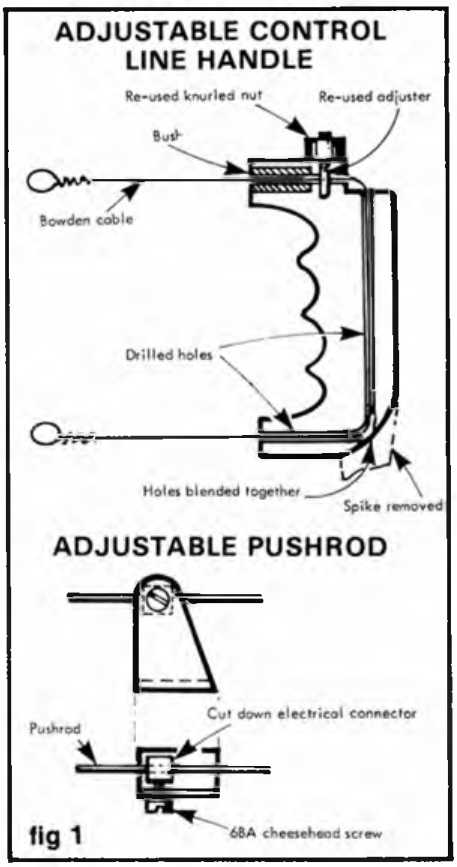


fig 1

SEEN AT: AMERONGEN INTERNATIONAL

Silver Ghost. Very high aspect ratio wing for control line aerobatics. Large % flap area. OS 40 powered. Weight - 53 ozs. byd Henning Forbech of Denmark. Far left., Albrecht Reichle of Germany with still immaculate 10 year old "Coronado". ST 46 motor. Left., Albrecht winds lines with battery powered electric drill.

VINTAGE CORNER

WITH ALEX IMRIE

SVAS Day 1984

This regular Old Warden meeting has become a popular venue for vintage modellers who are not slow to grasp any opportunity given them to get together and fly their creations. Coming between the Scale Days and the Vintage Day, it is not usually quite as well attended as the aforesaid meetings but this does not detract from the sheer enjoyment of it. In fact, because of the lesser numbers one is able to better see all the activity and has more time to chat with the modellers. The result is a thoroughly pleasurable meeting keenly looked forward to by the dyed-in-the wool vintage enthusiast. This year on 22nd July the weather was fine but a variable wind gave conditions that produced the usual turbulence in the lee of the nearby trees and also at this position on the aerodrome, sometimes gave drift that took models into the foilage. A number of models were "treed" and some lost in the thermal uplift that prevailed. Amongst the flyaways was Tony Penhall's 'Black Magic' with a rare *Reeves* petrol engine abroad, while the number of models ensnared by the branches included an Ian Potts' 'Kanga Kub' fitted with a *Cameron* 23 petrol engine. This was especially bad luck for Ian, since his 'Kub', after making some good flights at the Warwick meeting a few weeks previously had "come in" on power and been damaged, now at the model's next outing it could be seen but not retrieved . . . it was enough to drive a man to R/C!

Control line areas were active all day and much flying a was done by a larger *Fokker* Dr I 'Triplane' whose markings of red top wing and tail-unit proclaimed it to be a model of Manfred von Richthofen's 152/17. On one occasion the 'Triplane' was joined by a *Nieuport* 17 and a real tail chase ensued! The radio assist flight-line sported some forty models of all types, one machine towing a banner advertising the meeting. Several excellent 'Tiger Moths' and other scale models were seen but the majority of the machines in this area were vintage designs. Tom Wilmshurst, who makes his own large capacity two-stroke glow plug engines, carefully designed to possess all the merits usually considered to be the prerogative of the four-stroke, had with him, in addition to his well known red and yellow *Taibi* 'Hornet' and 'Powerhouse', a large Ed Rogers' design from 1950 named 'Sizzling Shadow', similarly coloured to the other two and fitted with an 11cc engine of his own design and construction. The 'Hornet' had expienced a structural failure only a few weeks previously while flying at Baldock during the North London R/C Club's vintage meeting, when at 200 feet, the wings parted company with the fuselage. Looking at the immaculate 'Hornet' at Old Warden, one could not see any evidence of that headlong plunge that had been terminated by the unyielding Bedfordshire terrain. Tom admitted to having put in some rather concentrated hard work to repair the damage in time for the SVAS meeting.

John Wilkins with his attractive gull-winged Micheal J Roll design, built from plans in the 1938 Zaic Yearbook (see text).

Right, OS 40 four-stroke powered Cyclonic, a pre-war design by D A Russell, built by Dick Barton from Barnet (see text).

Above; Ian Potts and his Cameron 23 ignition powered Kanga Kub, "tree'd" at Old Warden on SVAS Day, but eventually recovered.

Under Construction/Cyclonic

An unusual model that did a great deal of flying during the day was John Wilkins' "Under Construction" powered by an *Oliver* 'Major' engine, this was an 8 feet 2 inches span version of the high aspect ratio gull-winged Michael J Roll design that appeared in the *1938 Zaic Yearbook*. The name probablly stemmed from the fact that when Roll submitted the information to Frank Zaic about the model, it was unnamed and in fact still being built, anyway the name "Under Construction",

Left; R/C Assist flight line with the large Ed Rogers' 1950 design built by Tom Wilmshurst in foreground.

George Hunter of Harrow with his appropriately decorated Red Zephyr, also powered by the OS 40 four-stroke, a popular engine with R/C Assist vintage flyers.

although novel, would seem to be the name that will identify this graceful machine from now on, Dick Barton from Barnet had an *OS* 40 four-stroke powered version of D A Russell's AM Cyclonic which was described in both *Aeromodeller* (December 1936) and in the first edition of the book "The Design and Construction of Model Aircraft". Nicely finished, the model was complete with the registration used on the original, G-AAMC, and featured a small elevator tab on the starboard tailplane only, which provided sufficient control in pitch. Dick had used very small diameter wheels and while the size used on the original was variously stated to be *Model Shop* 2 ½ inch and 4⅜ inch diameter, photographs of D A Russell's model shows that he used the latter. Dick's model would certainly look better (and handle easier on the ground) with the larger size wheels.

A very nice TD Coupe powered by a *PAW* 249 diesel was flown by Clive Bunyan, beautifully built, it featured a vac-formed ABS cowling complete with dummy exhausts stubs exactly as per the wooden cowl on the original model by Theodore Dykzeul which was described in *Model Airplane News* for October 1936. Amazingly, this model had survived a flyaway of over one hour's duration at a previous meeting. Fellow Scot, George Hunter of Harrow was flying a 'Red Zephyr' powered by an *OS* 40 four-stroke engine and this model was painted up just like the model used in the old *Scientific* advertisements for this Herbert Greenberg design. It was nice to see Peter Fisher of *Performance Kits* again, across from his home in the IOM for the meeting, he was flying a *Mills* 1.3 Mk II powered half full-size 'Cloud Airmaster' finished in a delicate shade of green which is an unusual colour for a model that sometimes makes it difficult to locate in this "green and pleasant land".

Boehle Giant

Diane Humphreys' 'Boehle Giant' is hard to avoid, looking at the amount of structure (tailplane like a table top!) one finds it almost unbelievable that Vernon Boehle's original flew on the power of a 6cc 'Baby Cyclone' in 1936, remembering that his 'Cyclone' must have been an early fixed-ignition version which did not produce anything like the pep of the later 'E' and 'F' models with their improved porting and variable ignition. Diane's parents, Ann and Jack have built many large vintage free flight power models and Diane, not to be outdone would only settle for a "real big 'un" (see Vintage Corner May Last). The finished model was at the Warwick meeting but unsuitable weather prevented it being flown. However, at Old Warden, the weather and the readiness of the 14 foot 'Giant' meant that some test glides could be undertaken. Since all seemed well, the engine was started-up and a short power flight embarked upon. The motor apparently worked loose and stopped suddenly causing the 'Giant' to arrive in a steepish nose down attitude and turn over. This revealed the need for some minor modifications but Diane was pleased and doubtless she will tackle the outstanding R/C installation so that the Vintage Day meeting should see her handiwork properly airborne at last.

All flying ceased around 3 o'clock at the request of a 'Tannoy message' heralding the arrival of an RAF 'Vulcan' which made a few low passes. As the camouflaged delta passed quietly overhead, I heard an avid scale fan proclaim . . . "They have got the markings all wrong!" Another full-size delta was seen later in the afternoon, when a powered hang-glider began an approach but the sight of modellers all over the landing area, or a steady "red" from the aerodrome control van must have decided the pilot against landing, since the machine pulled-up and turned away and was last seen climbing laboriously in a north westerly direction,

Richard Falconer of Gloucestershire had his HJ Towner designed *Airspeed* 'Envoy' with him. To counter torque problems he was using opposite rotating propellers and still unpainted, this model must surely hold the record for one of the longest elapsed times in building. Richard started the 'Envoy' some twenty years ago and was able to relate that each component completed marked various events in his family life. Brought to airworthy condition only the evening before, perhaps we will yet see this model fully decorated at Old Warden in 2004 (family chores permitting)!

Dave Baker's familiar red and black decor was seen on a number of models, some emblazoned with the names of jazz musicians from the appropriate period, these included a 'Lanzo Record Breaker',

E A "Bunny" Ross, famous pre-war modeller of large designs including the 10 feet span rubber-driven Rosignol, made a welcome return to competition flying at Fairlop in 1947 with his Frog 100 diesel powered Strato-D. Can any reader please put us in touch with "Bunny"?

'Mousetrap' (Chet Baker) and a *Cleveland* 'Viking'. I was greatly taken by his rare Loes low-wing design (Earl Hines) complete with external streamline housing used on the original petrol powered model to hold the necessary ignition components like coil and batteries and thus give ease of access as well as lowering the centre of gravity. This external "bomb" was similar to that used by veteran modeller Peter M Bowers as a luggage carrier on his full-size 'Fly Baby' home-built a number of years ago. At the end of the day I failed to find out who had obtained the award for the best model of a *Shuttleworth Collection* aeroplane, in fact I cannot remember seeing many such replicas at the meeting. There were a number of rubber-driven flying scale models and Peanuts, as well as a variety of CO2 powered scale models, John Blagg had a selection of models with him including his very fine *Blackburn* 'Blackburn' resplendent in silver dope and Fleet Air Arm markings. So although one tended to lose sight of the main reason for the *SVAS* meeting, it provides for the vintage enthusiasts a means of getting airborne and meeting others smitten with the bug and on both of these counts we are all indeed grateful to the *Shuttleworth Collection* for allowing us the use of their facilities.

Alan Crompton made this rubber-driven ornithopter based on the design by J H M Smith that was published in December 1940 Aeromodeller.

Below; Father Amiard officiates with stopwatch (note his SMAE badge) at the 1948 Flers meeting, as Emmanuel Filion releases his famous power model that gained 2nd place in the Claude Sallé Trophy.

Father Amiard

We have only just heard of the death in May last year of the Rev. Father Abbé René Amaird, the French priest who was a keen aeromodeller and an untiring worker for international understanding in the hobby. He was 85 years of age and had been in poor health for a few years. A native of Flers in Normandy, he was an Honorary Member of the *SMAE* (proudly wearing that attractive blue and silver badge on his cassock) and was not only very much in evidence at model meetings in his own country but also became a part of the British aeromodelling scene, attending all our major international competitions with the French contingents. In the 1930's once France decided to introduce aeromodelling into schools as a regular subject, Father Amiard, not only taught the subject in his progressive school at Flers but also ran a highly enthusiastic club there called 'Escadrille de Cedres. He organised Franco-British meetings both before and after the war and these were eagerly attended by groups of our top modellers. His hospitality was legion, he even ensured that "English Breakfast" was available at his meetings and nothing was too much trouble for him to make his guests feel at home. It was typical of Father Amiard that he "arranged" to be in London before the *SMAE* party of some 30 members left for the 1938 Wakefield at Guyancourt. He accompanied them by boat and train and was not only responsible for the party's smooth transit through French Customs but remained absolutely at the members' beck and call for the whole of their stay. Small wonder that he was loved and respected by all who came in contact with him. He greatly enjoyed the visits that he made to this country when our own Rushy, Eddie Cosh, D A Russell, A F Houlberg and many others reciprocated the hospitality at Faireys and at Eaton Bray. In 1939 he took part in the first French indoor meeting at Amiens and although only a beginner at this branch of aeromodelling, he came 19th in a field of 70 entrants. In that year his Flers meeting was arranged to include a petrol model competition for which Father Amiard presented a fine trophy, not unlike the Schneider Trophy in general layout but a certain Adolf had other ideas and by the competition date of 19th September more serious things were afoot.

Frank Zaic met Father Amiard at both the 1937 and 1938 Wakefield competitions and writes, ". . . he was also Professor au Petit Séminaire de l'Immaculée-Conception à Flers in Normandy teaching English. During the war, I sometimes wondered how he fared as he lived inthe war zone. I am not sure how but we started to correspond after the war and I visited him in 1949. I remember he brought out a bottle of wine, saying that he had saved it especially for me. I did not ask, nor did he mention, what he did during the war period . . . much later he sent some cuttings telling us of his "Jubilé d'Or" celebration on 13 June 1976. The list of guests included high-ranking military and civilian dignitaries from France and England . . . whatever he did during those trying days merited their attendance. Also on this occasion the French National Aero Club awarded him a gold medal. And the church honoured him by making him a "Chevalier" in the "L'Ordre Hospitalier et Militaire de Malta" (Founded in Jerusalem in 1090) . . .".

Alwyn Greenhalgh was able to tell us that an aeromodelling friend had recently visited Flers to attend a reunion of the 11th Armoured Division and that a square in the town has been named after Father Amiard — "Place de l'Abbé René Amiard". The naming ceremony took place on Sunday June 3rd 1984 at 12.15 pm. During the course of the ceremony a detailed history of Father Amiard's remarkable life was given, a great deal of which alluded to his national and international connections with model aviation. So the "Aimable Amiard" as Rushy called him, is gone, to join Rushy and most of the others of that band of happy warriors who made the yearly pilgrimages to Flers and Faireys. Fortunately, we can still enjoy some of the atmosphere of those days through reading articles that C S Rushbrooke and others wrote in the early issues of this journal. But what of the "trying days" and Father Amiard? I would like to learn more about that. Was l'René one of those who waited in some French field to light the stable lantern flarepath for the black 'Lysander' that circled overhead? I'll bet that he was . . . maybe one day someone will tell us about *that* Father Amaird.

Gears

Rubber enthusiasts who require gear-wheels will be pleased to hear that P Mason of 186 Hatton Road, Bedfont, Middx. TW14 9PR is able to make these in any size and number of teeth. Professionally made in brass, recessed with lightening holes, the samples seen are real engineering jobs that will stand up to the demands of heavy motors. The current price is £6 per pair but depending on demand it is hoped that the price can be reduced somewhat. Engine repairs are also undertaken, so those of you who require quality treatment are recommended to contact Peter at the above address.

Below., 5 cc Marquet French diesel brought back from Lyons in 1946 by Howard Boys, has been sold to open the Howard Boys Memorial Fund.

ON TEST

Stan Bray puts the SHAPERSAW through its paces

This excellent product will make a fine addition to any aeromodellers workshop at about £45 from your local DIY shop.

FINE SAWING of wood when making models is always something of a problem. The use of modelling knives is not always satisfactory as strands of grain often remain and these are sometimes difficult to sand down to a neat edge. The use of a piercing saw or a fret saw is really the ideal answer but sometimes using these can be both time consuming and also result in a loss of accuracy unless a great deal of care is taken. The answer that manufacturers have provided us with, is a mechanically operated fret saw and these have been on the market for many years. Modellers have used them with great success but the problem in general has been the bulkiness of these machines. This in turn has meant the necessity to provide a permanent operating site in the workshop. The *Shapersaw* is in fact, a neat self contained unit that answers all these problems. The motor is completely enclosed and the casing is provided with rubber feet that really do grip a table and prevent it from jumping all over the place. It is light enough to move easily and the enclosing of the motor makes it easy to keep clean.

All these things were immediately obvious when I was asked if I would test a *Shapersaw* and report on its suitability for the modeller. Whenever I am asked to test machines, I always set about working them to their absolute limit and this is exactly how I treated this one. I started by cutting 3mm thick balsa and obechi sheets. The machine tackles them with ease and it was possible to make very tight curves without any signs of catching up the blade. I graduated to 6mm plywood and again no resistance was offered by the wood no matter how much I wove the saw about, however, as is the case with all fret or band saws pressure had to be applied to the bottom of the material and not the top for best results. From here I moved on to a piece of 25 x 25mm soft wood and whilst I did not feel that the machine was over fond of the task I had set it, nevertheless it went through the wood. I took a piece of scrap balsa some 35mm thick and with ease wove a jig saw pattern through it. When the piece came out there was no sign at all of any snagging on the wood, just a fine line all round the edge. Deciding that I was not trying hard enough I had a go at a 15mm thick piece of teak. Given time (a great deal of it) the saw slowly worked through it but only after I had slowed down the cutting speed. I did feel however that with a coarser blade it would have tackled the task quite well. Next I tried two pieces of the same material glued together and here the machine decided enough was enough and refused to cooperate further!

I next went on to plastic and there was absolutely no problem whatever cutting sheets of plasticard to various patterns. Next I tried some 6mm plastic sheet, I do not know quite what type it was but it was fairly flexible. The machine cut it without any problem but I found that it also generated enough heat to stick the plastic together again. This did not happen when a harder plastic of similar thickness was cut. From plastic on to metal . . . I found that there was no problem cutting brass and nickel silver up to 22 gauge but when I came to a peice of eighteen gauge brass it stalled. The secret usually is, as I have said, to press the material downwards and prevent it riding up the blade but even doing this it would not cut the material. A piece of steel of similar thickness has the same result, then I carelessly released the metal and broke the blade. Considering though the amount of work that blade had done I did not think that it was bad going! A new blade made no difference to the machine's ability to cut the material. I went onto aluminium but it was not as happy with that as it had been with brass. The problem with this mateial is that it clogs the teeth of the blade and makes cutting difficult on *any* machine. Nevertheless it did cut up to twenty gauge. All in all I thought that the ability of the machine as far as cutting material was concerned was very good and well up to the standard of what one could reasonably expect from a machine of this size.

The machine comes complete with spare blades and a hexagon wrench. The wrench is required for blade changing and speed adjustment both operations being remarkably easy. The use of a wrench also avoids those chewed up screw heads that invariably occur when blade changing is done by means of ordinary screws. I thought the speed changing facility was particularly useful and I cannot recall having seen it before on a machine of this size. The makers advertise it as a saw that will cut material but not your finger. This may sound an odd claim but it is basically true. The top bar holding the blade is of very springy construction and any pressure at the upper part causes the machine to stop, hence the need to press down on the material. It will not therefore cut a finger as the pressure is applied high enough to prevent this happening. I must confess I did not put my finger to the bottom part of the blade near the table where I felt that the result might be different, so I cannot pass comment on this! Even so the machine is the safest I have ever seen and is one which can be used by a youngster with very little danger to themselves. It will have many uses to the modeller and will prove particularly useful to those modelling aircraft, ships and small gauge locomotives, where thin gauge metal will be used. One further point that is well worth mentioning is the fact that I ran the machine for an hour at a time, which I consider is reasonable for a machine of this type. The motor got warm but there was no question of overheating.

Right; Intricate shapes can be cut in thick balsa with no difficulty. Ply, metal and hardwood can also be tackled confidently.

AEROMODELLING TECHNOLOGY

Practical modelling ideas from Aeromodeller readers

FREE! SUBSCRIPTION

One year's **Free Subscription** to Aeromodeller will be awarded to whoever, in the opinion of the editor submits the best idea for publication in *Aeromodelling Technology**. We will pay £5.00 each for all other items published.

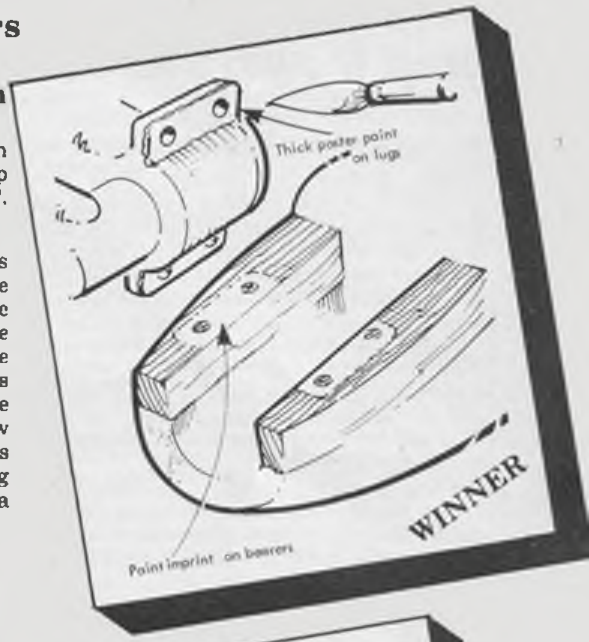
*Limited to one subscription per annum, per person.

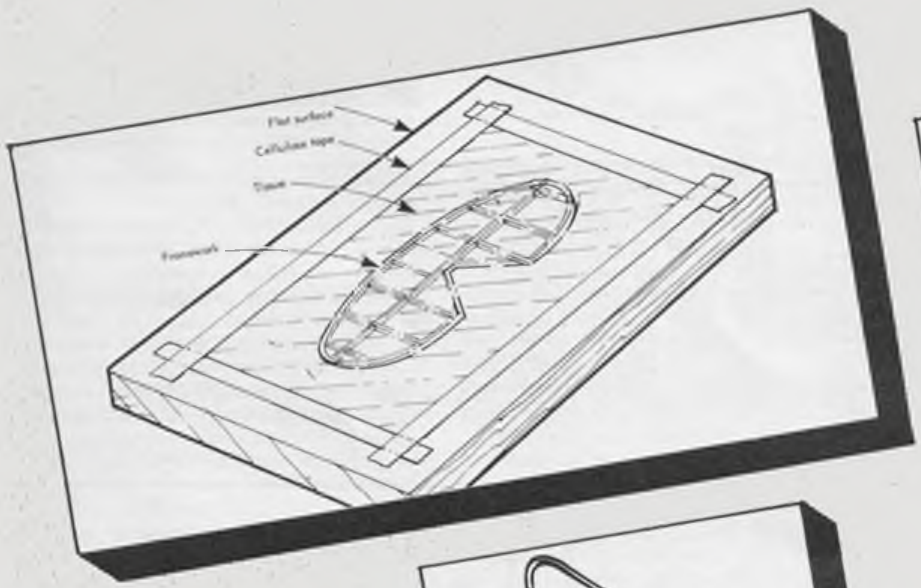
Send your ideas to: Aeromodelling Technology, PO Box 35, Wolsey House, Wolsey Road, Hemel Hempstead, Hertfordshire HP2 4SS.

Engine mounting hole location from Mrs. P. A. Ratcliffe

Solutions to this problem have appeared in the past but as we all occasionally come up against this problem, this idea from Mrs. P. A. Ratcliffe is worth noting ...

To find the accurate location of an engine's mounting holes prior to drilling engine bearers can be frustrating ... here is the easiest system I have found. First paint the underside of the engine lugs with white poster paint ... secondly, whilst the paint is still wet, position the motor on the engine bearers where required. You should now have a perfect impression of the engine lugs on the bearers. Thirdly, drill your mounting holes and wipe off the poster paint with a damp cloth – simple isn't it!

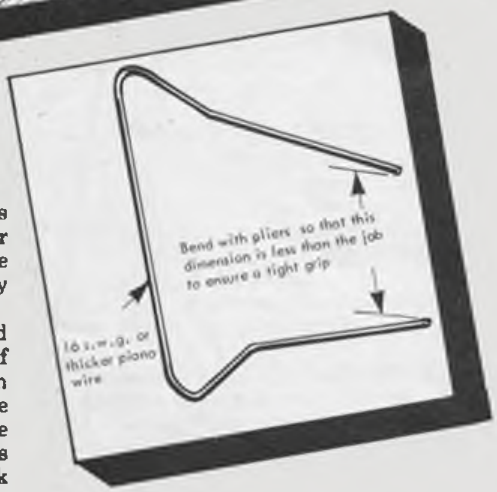




Reducing warps due to tissue covering from J. Bray

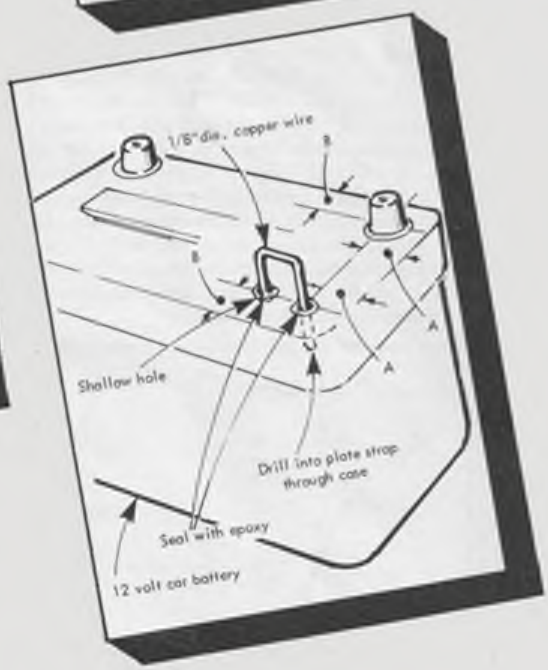
When covering relatively fragile structures such as flat-bottomed tailplanes for indoor scale models it is often difficult to preserve the flatness due to the tensions produced by the shrinking tissue.

The drawing shows a method I have found effective: a piece of tissue is cut in the form of a rectangle about an inch larger in length and width than the structure. The framework is stuck as smoothly as possible to the centre of the tissue and the tissue is stuck to a flat surface with the framework underneath the tissue, using cellulose tape. The tissue is now water sprayed or brushed and allowed to dry. As the tissue shrinks the tension due to shrinking is taken by the cellulose tape and no warping is caused. The tissue should now be doped and left to dry. The part can then be removed and trimmed and the operation repeated for the other side.



Ultra simple clamp from P. McCarthy

Mr. P. McCarthy nearly panicked when performing a repair with five-minute epoxy ... and found his 'G' clamps were not big enough! This idea is the result of his overactive brain dealing with the problem! Don't Panic ... go bend some wire!



Car battery conversion for glow plug power from E. Marsden

If you wish to use an old 12 volt car battery for use with glow plugs – you could have a problem! Some modern batteries do not have the terminals to each individual cell visible. This idea has worked on a number of occasions and is really very simple (*good ideas often are ... Ed.*). Measure the position of the centre of one terminal, draw a line square across the battery and drill in the similar spot on the other side. Drill a hole to take a piece of 1/8 inch copper wire, which is pushed into the battery so that it is in contact with the plate. Firmly epoxy this into place – you now have a somewhat heavy but useable 2 volt power source for your glow plugs.

AT THE LAUNCH PAD

John Wheddon takes us a further step forward to lift-off . . .

Model Rocket Launchers

After naming this column "From the Launch Pad" it is perhaps appropriate to discuss exactly what is involved in the safe launching of model rockets. Two separate parts are involved, the launcher itself and the electrical ignition system. . .

Launchers

The purpose of the launcher is to support the model during launch until it has reached a speed at which the fins become effective and the model is aerodynamically stable. Also the launcher is necessary to aim the model in the required direction.

A basic launcher suitable for rockets up to 'C' (10 Newton seconds — more on engine classification in a later article) engine power is a ⅛in dia. metal rod, 36in. long. This is usually mounted on a tripod or an adjustable but firm base so that the launch angle can be varied to suit the wind direction. Remember that model rockets always tend to follow a curved flight path which turns *into* wind. This is known as weather-cocking (fig. 1) and it is necessary to compensate for the effect, by setting the launch rod at a suitable angle. On breezier days this effect can help prevent lost rockets if the launcher is actually angled slightly *into* wind. The height achieved will be lower and the model, after travelling upwind, will be in sight for a longer time as it descends on its parachute or streamer.

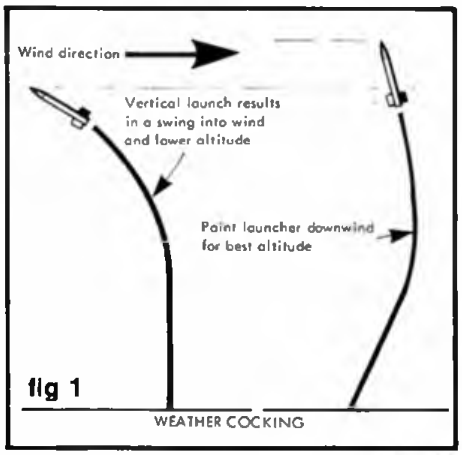


fig 1

However, under no circumstances should the tilt applied to the launch rod exceed 30°. Beyond this angle, safe, predictable flight cannot be guaranteed. *Model Rocketry Safety Codes* issued in U.S.A., Canada and this country do include this stipulation along with all the other major factors involving safe operation of model rockets.

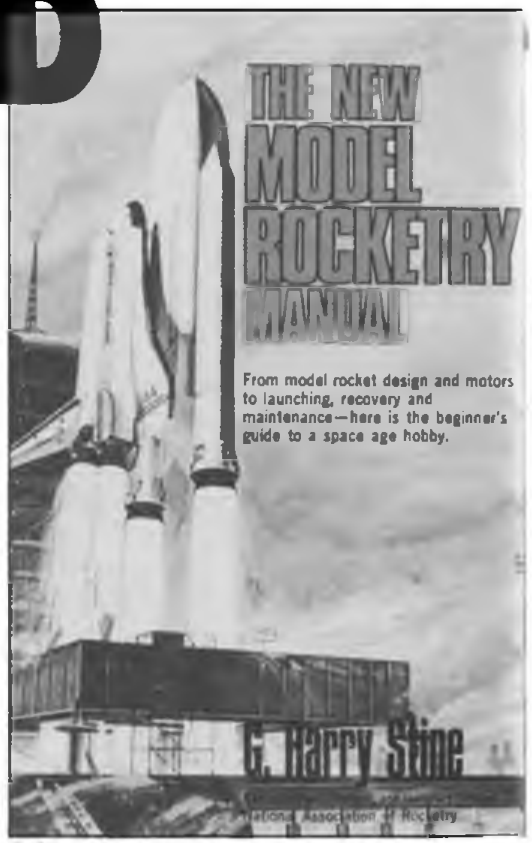
Several launchers are available commercially and the "Big-Foot" type, produced by *Estes* is fairly representative (fig 2). Note that a steel exhaust-deflector is fitted and also the wire supports which set the model at the desired height on the launch rod. The exhaust deflector is a vital component which directs the engine exhaust away from the launcher and the model itself. If no deflector is used the exhaust can bounce back from a flat surface and cause scorching around the tail cone and fins of the rocket. My own knowledge of this was gained the hard way of course and was commemorated by some friends who awarded me a suitable model fire-engine!

Models heavier than 6oz...scale types with a lot of surface area and boost gliders, can sway alarmingly on the launcher in the gentlest of breezes. Here it is necessary to use a stronger launch rod, usually 3/16in. dia. The standard 36in. length is still normally sufficient for these larger types.

Table I lists a summary of model weights for a range of *Centuri* engines and shows the launch rod requirements.

Table I

Type	Total Impulse N-Sec	Lift Off Weight Oz.	Grm	Launch Rod dia.
½A 6-2	1.25	2.5	70	⅛in.
½A 6-4	1.25	1.5	42	⅛in.
A 8-3	2.50	5.0	140	⅛in.
A 8-5	2.5	2.5	70	⅛
B 4-4	5.00	4.5	127	⅛
B 6-4	5.00	5.5	155	⅛
C 6-5	10.00	5.0	140	⅛in.
C 6-5	10.00	5.0	140	⅛in.
C 6-3	10.00	6.0	170	3/16in.
D12-3	20.00	10.0	283	3/16in.
D12-7	20.00	8.0	226	3/16



G. Harry Stine's book for beginners has launched many rocketeers on the path to success.

The table is based upon 18mm diameter engines and assumes a rocket of conventional form, i.e. it would not cater for flying saucers, with enormous drag or similar unorthodox models.

The launching attachment on the rocket is usually a short length of cardboard or plastic tubing attached close to the model's centre of gravity (balance point). It is important to ensure that this launch lug is correctly aligned parallel to the body tube so

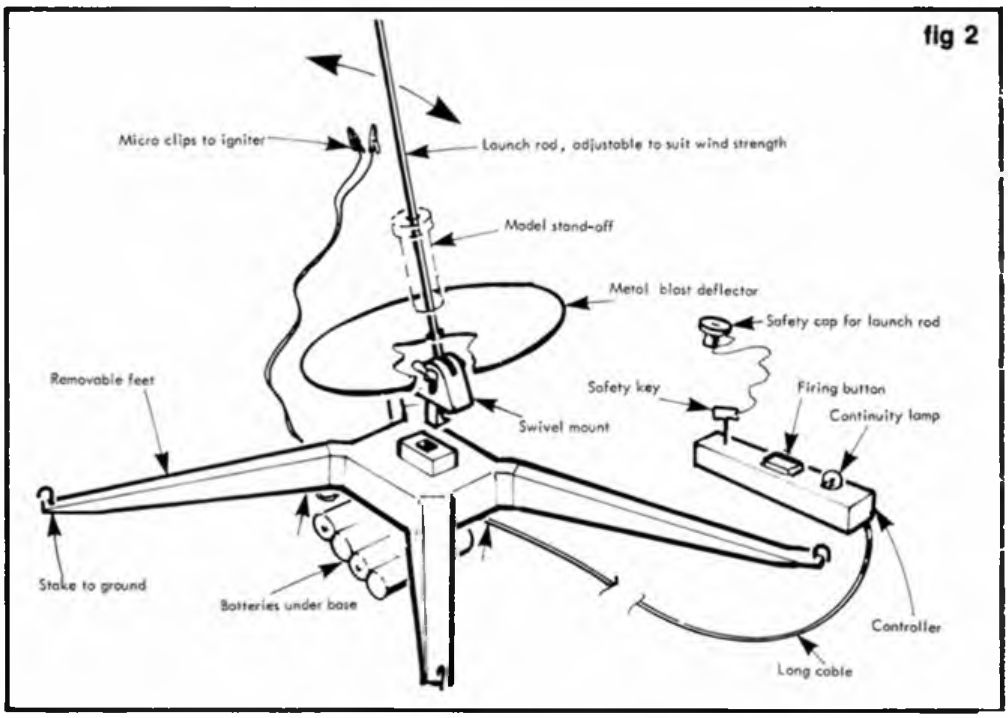
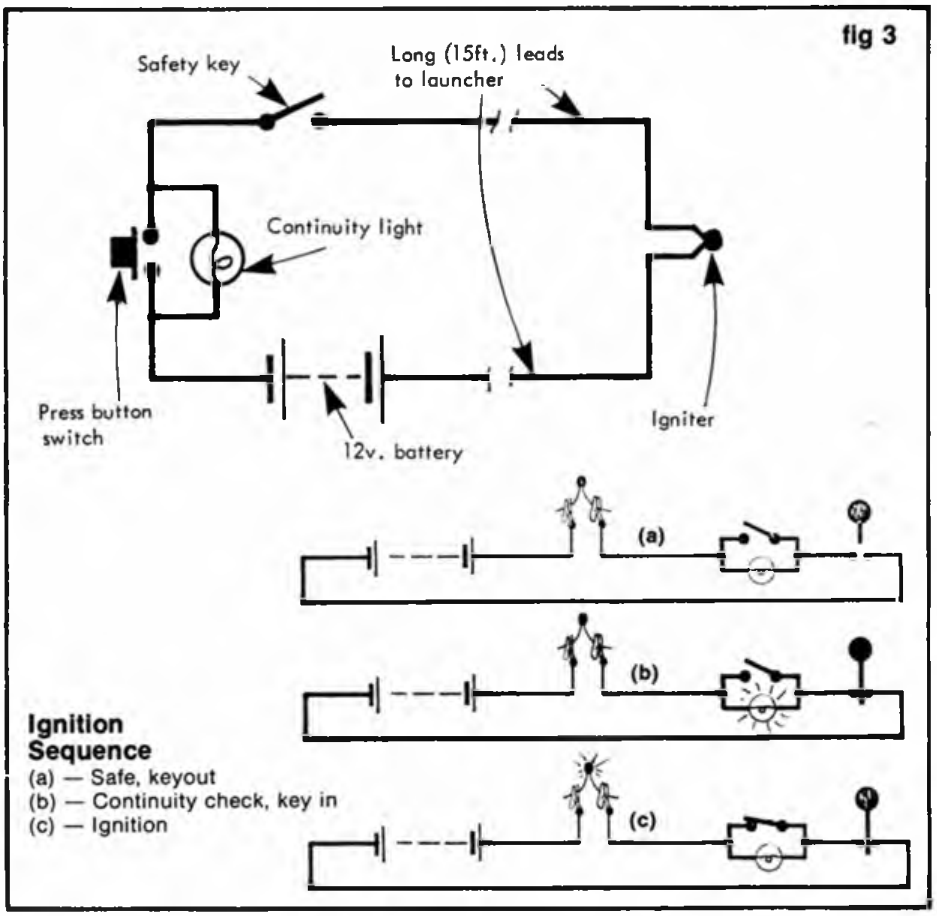


fig 2



that drag is minimised. Badly aligned lugs can also cause unwanted friction during launch.

A safety aspect which is easily forgotten in the haste to launch is the possibility of serious eye injury from the launch rod. Whenever possible the launcher should be set up on a table or trestle so that the top of the rod is *above* eye level. Failing this a safety-cap should be used to prevent injury. An additional bonus is that the safety cap can be useful in finding the launcher again after retrieving the rocket!

Electrical Ignition Systems

All commercially available model rocket engines are supplied complete with ignitors for electrical operation and for a very good reason. Electrical ignition is the safe and proper way to start a model rocket engine and is the *only* method permitted in competitions and organised displays. Launch controllers can be set up a safe distance from the rocket on the launcher so that a good safety watch may be maintained. Stray dogs, children, unexpected aircraft and helicopters are all good reasons to *not* proceed with a launch and it is an easy matter to *not* press the button! It is not so easy, in fact, probably impossible, to prevent a launch once a fuse has been lit...

Various electrical systems are available commercially and these are usually the best option for a newcomer to the hobby. The electrical system is often combined with the launcher and this is the case with the "Big Foot". The batteries fitted into the base provide useful weight to stabilise the launcher. This is quite useful and is a good practical approach but it is often desirable to have the electrics separate from the launcher, especially when flying larger rockets or boost gliders.

The commercial set-ups are often designed to operate with special low-voltage ignitors. This is, at first sight, a good idea because cheap, throw-away batteries can be used but there are some important drawbacks. Firstly, it restricts the user to a particular series of ignitors which may not be suitable on another manufacturers' engines and secondly it is more sensible to use the large capacity car or motor-cycle battery. Literally hundreds of launches can be obtained from a car battery before recharging is necessary and ignition is virtually instantaneous on pushing the button.

A schematic diagram if a launch control system is shown in fig 3. This is the layout of the *Centuri* "Power-Control" and in this unit the press-button switch, safety key and continuity light are mounted in a moulded plastic reel. Large crocodile clips are supplied to attach the unit to a car battery and a 15ft. length of lamp-flex, fitted with micro-clips, completes the hook up to the ignitor.

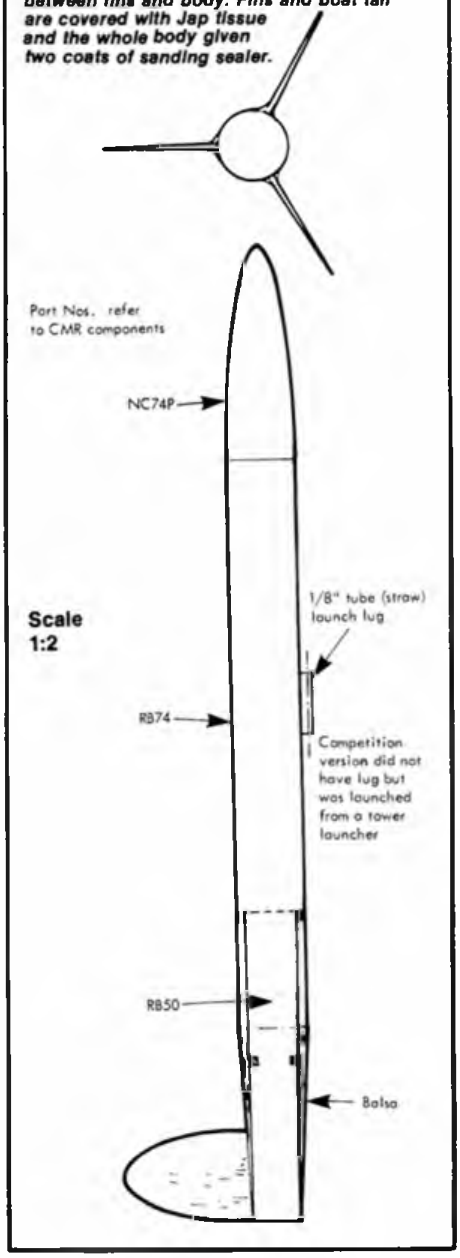
The two main points to watch when home-building a system concern the safety key and the press-button switch. The safety key is an ESSENTIAL item. Various methods can be used but the function of the key is to disarm the system, i.e. with the key removed *no* firing can take place. It is helpful to combine the key with a prominent, brightly coloured, safety cap for the launch rod which can help to prevent the risk of eye injury.

The firing button (the press-button switch) must be the kind which returns to OFF when released, like a door bell-push. Combined with the safety key this type of switch gives the best possible safeguard against unintentional firings.

New Book

The original "Handbook of Model Rocketry" has been for many years *the* book of model rocketry. Author G. Harry Stine has also produced an abridged and revised version entitled "The New Model Rocketry Manual". The latest edition of which is now available in this country. The manual is an invaluable introduction to the subject and presents a huge amount of useful tips and information in an easy, understandable style. Priced at £2.95 from *Albion-Scott Ltd., Bercourt House, York Road, Brentford, Middx., TW8 OQP.*

Chaos by P. D. Freebrey. This rocket is primarily intended for international class parachute duration using mini motors 11mm in diameter. The original was made using Competition Model Rockets lightweight tubes and nosecone. Fins are 1/16 in. balsa sanded to a symetrical section. The boat tail is made from scrap light balsa and sanded to shape. Note epoxy fillets between fins and body. Fins and boat tail are covered with Jap tissue and the whole body given two coats of sanding sealer.



EXPERTS FORUM

Top Wakefield flyer flyer Mike Woodhouse tells all. . .

June Woodhouse with Author Mike Woodhouse's 1983 Wakefield Class rubber powered model.

LIKE MANY of those flying competitive free flight, my introduction to aeromodelling goes back a long way. The first attempt was at the age of about eight, when with the aid of my father, I tried to build a *Kiel Kraft* "Playboy". Over the next few years I went through (literally) the whole of the *Kiel Kraft* rubber and *Jetex* powered flying scale series, most of which failed to fly...one day I shall have to build another and make it work! However, I had started an aeromodelling career which I was determined to successfully pursue.

With a group of school friends I flew control line combat in the fifties, the high spot was the winning of the area combat champs in 1957. I also acted as pitman for Dave Oldfield in a Class 'A' team race at Radlett in the same year!

About the time Arthur Wharrie from York joined the Norwich Club and I was impressed by the way his models flew, so much so that free flight held more attraction than control line. My first free flight contest was the *Aeromodeller* "Golden Wings" event at Radlett — this was a miserable failure but things could only get better. About this time a group of keen free flight flyers formed in the Norwich area and with help from experienced flyers in the S.M.A.E. East Anglian Area we soon became fairly effective in local and National events.

My prime interest at this time was A/2, glider, flying variations of the "Altair" and "Lucifer" with some degree of success. My first attempt at a team place was in 1961, this turned out to be a disappointment and a re-think of my approach resulted in the "Wichita" A/2, but that's another story!

The "Whiskas" Wakefield class rubber models were first begun in 1961 — back in the good old '50 gram' rules. These models were originally a cross between Reino Hyvarinen's "Jeppe" and Geoff Lefever's "Fevair". Both models can still be seen in the current layout.

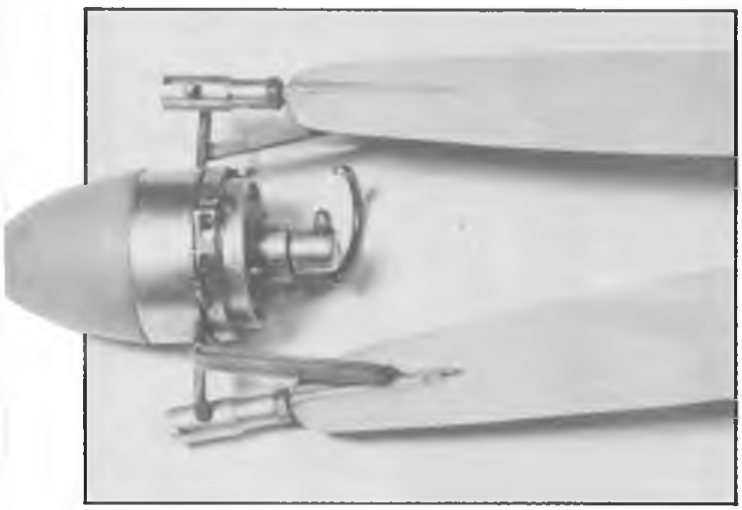
Without going into a model by model development programme, I will single out a few milestones. Basically the model reached a very good stable, reliable layout by 1963, (nearly made the team — finishing 4th). I then embarked on a series of "improvements" until I reached the same point again in 1965. With the advent of 40 gram rules, I stretched aspect ratios and cut tail areas — again "improvements". By 1969 I was back to the start again with a change or two that worked. These changes included a right/left trim copied from John Malkin (New Zealand) whose model I proxy flew in the 1969 World Champs.

I next built a model with 5in x 48in wing, using 63 sq. in. tail, 16 strands of rubber Schwartzbach prop, flown right/left, it worked well, however not in time for the 1970 trials. Next trials I was better prepared but not good enough; a bad mistake, launching into bad air and that was that. Being worried by the right/left trim and turning out of lift, I went back to right/right with a prop operated auto-rudder from an idea of a few years earlier. This time I made both the Eurochamps Team in 1974 and the World Champs Team in 1975. The 1975 event gave my best result, with six maxes. The second flight, after climbing very high, the model went into a big, bad, hole.

The model was further developed and modified to gain a place in the 1977 Champs Team then for some time everything seemed to go wrong, at least until I made the 1980 European Champs Team. Since the late sixties my objective has been to obtain a team place in preference to other contests, an approach that had been successful with 2 glider and 5 Wakefield spots achieved. However, in the eighties it has become obvious that a new approach to Wakefield was required.

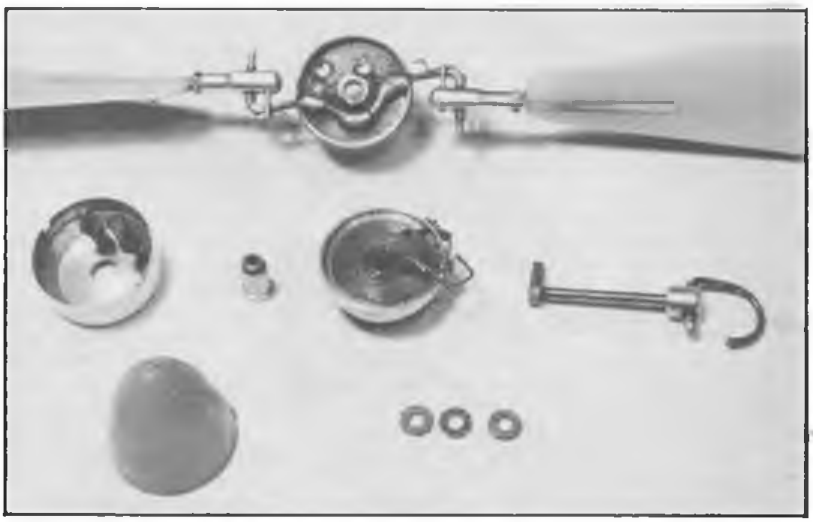
Design Philosophy

The current series of Wakefields was begun in 1981 after an objective re-appraisal that was intended to regain a competitive situation. Of all the international classes, Wakefield offers the widest variation in the method of achieving success. At one extreme we have the long, thin, all sheet French models. At the other the traditional chunky British approach. My preference is for a model that has a fast climb of about 33 secs as this seems to give the most consistent climb, a longer run, can, if the motor is weak or the air is poor, result in very little height being achieved and I don't think that the extra few seconds of run is worth that risk. Height is of paramount importance in achieving good times



Above; there is more to a Wakefield propeller than meets the eye. Clean apperances produced by snap-on plastic spinner.

Below; component parts of a competitive propeller. Considerable skill required to produce a unit of this quality, not to mention the enthusiasm.



providing the model doesn't glide like the space shuttle!

Layout

The model is conventional in layout with a bias towards the look of the Russian models whose performance I'm trying to emulate. The fast climb approach entails a climb with little turn, thus the model neither needs or can tolerate much in the way of wing warps or dihedral. One interesting point has been that the faster and straighter climbs have needed a larger fin to avoid "snaking" under power despite the lower dihedral angles.

Prop and Power

To achieve the climb I desire, I am currently using the 1975 Wakefield World Champs winner's prop powered by 34 strands of 3 x 1mm *Pirelli* which allows for about 330 turns. I have been trying 30 strands of 3 x 1mm *FAI* but I'm not as happy with the result and further work is needed on propellers to obtain a similar performance. Currently I've enough *Pirelli* to last a few years but this will eventually run out, so a solution has to be found. The props are carved from lime but to be effective and to keep the weight down to 7 grams per blade, they are carved *very thin* (1.5mm). Care has to be taken to ensure that the grain is similar in both blades otherwise uneven flexing will take place.

Finally the blades are finished with two coats of epoxy and carefully balanced and the tracking is aligned. The nose assembly should be frequently cleaned and oiled to avoid wasting power on unnecessary friction.

The prop features adjustable roots to allow fine adjustment to the pitch to achieve the 33 sec prop run (330 turns = 10 revs per second which I consider the best speed for a Wakefield prop).

Structure

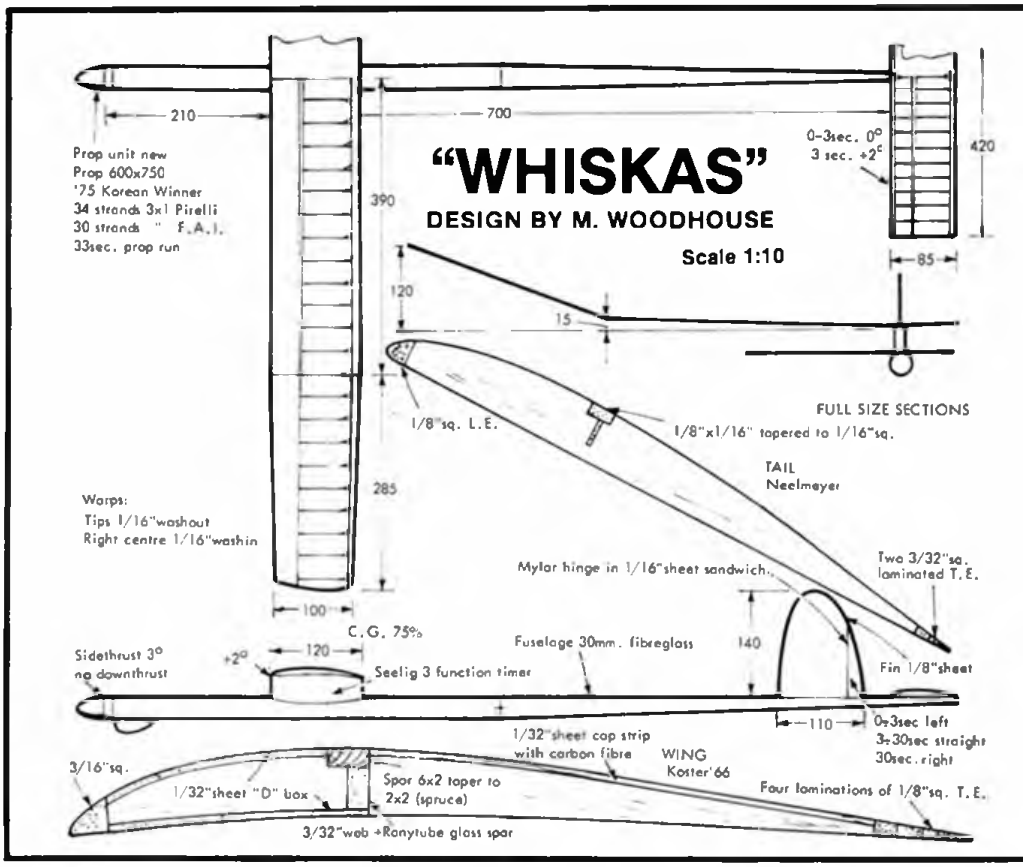
With 190 grams to play with it should be relatively easy to produce an airframe of the required weight with adequate strength. Over the years I've incorported "new" materials where they are of advantage.

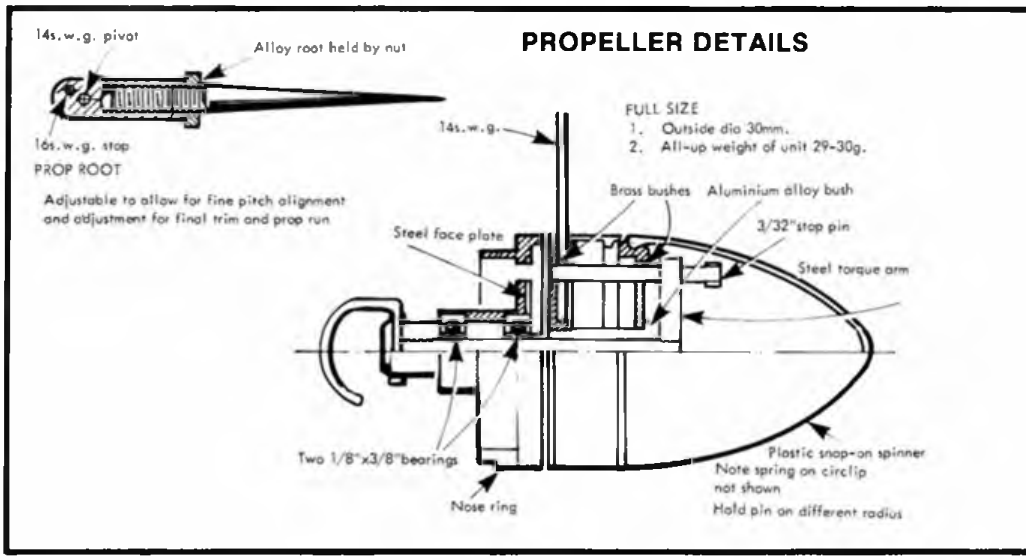
Wing: I have progressed through geodetics to the present 'D' box structure. The box is $\frac{1}{16}$in sheet with a tapered spruce spar and hard balsa web. The centre is strengthened by a glass fibre tube spar to take the force imparted by as vigorous a launch as I can manage. The ribs are strengthened by sandwiching carbon fibre between the rib and the cap strip, glued with thin epoxy. The ribs are also cut so that the grain is parallel on the rear portion of the rib. This, together with the carbon, helps avoid deflection of the trailing edge and changes to airfoil camber.

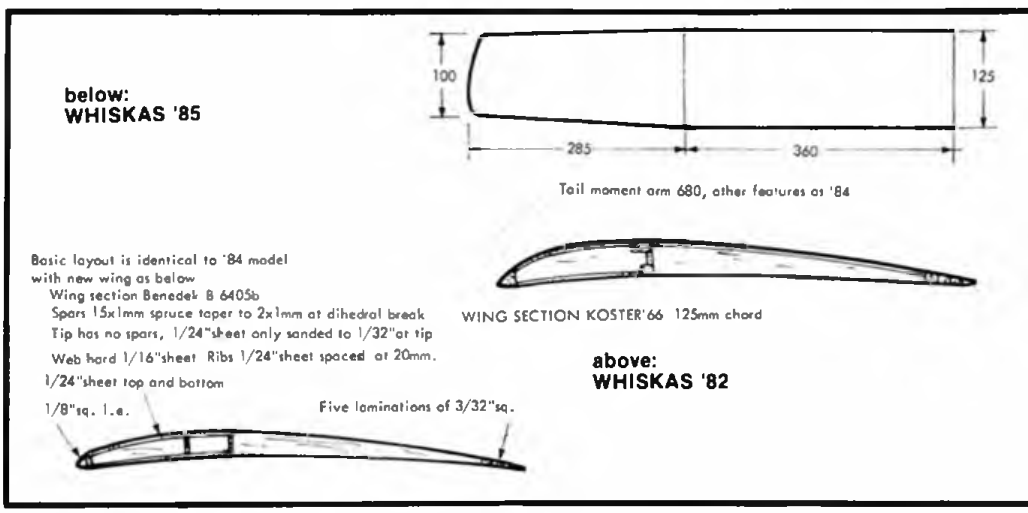
Tail: Simple and light as practical. Both wing and tail are covered in jap tissue.

Fuselage: I'm currently using glass fibre tubes for front and rear made by Laurie Burrows several years ago. These tubes were felt, by many, to be too heavy but the weight has been reduced to a satisfactory level by the liberal use of wet and dry paper. However, anyone wishing to duplicate the model could satisfactorily use balsa tubes.

Prop assembly: blades as described earlier. The front units are machined from aluminium alloy and employ journal races,







being finished with a spinner for looks as well as preventing dirt getting into the mechanism.

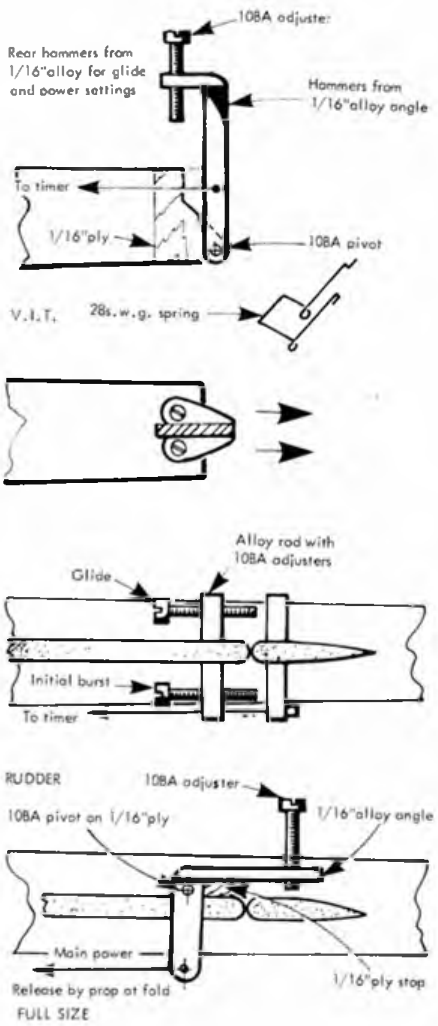
Systems & Rigging

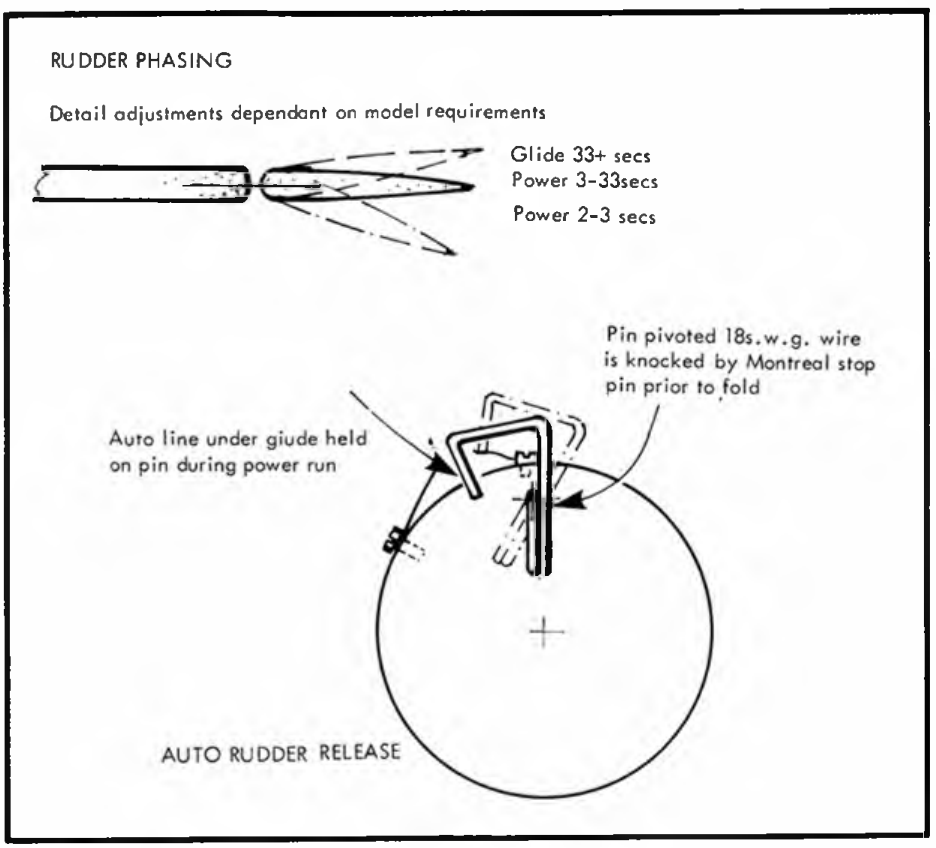
A *Seelig* 3 function timer is used in conjunction with an auto-rudder released by the prop stop. The operation is as follows:

1. The *rudder* is held to *slight left* for 3 seconds to give a straight ahead climb.
2. At 2-3 seconds the *rudder* is released by the timer to *straight* for the cruise portion of the climb.
3. At 4-5 seconds the *tail incidence* is released to *glide setting*.
4. At prop fold the *glide rudder* is released.

The system allows the power burst, cruise, and glide to be trimmed separately.

However, for it to work the VIT and rudder mechanism must be well made. I use $\frac{1}{16}$ x 1 x 1in. angle sawn, drilled and filed to shape, the pivots as well as the adjusters are 10BA screws. To release the triggers a *Seelig* 3 function timer is used. However, I have found they need to be carefully watched as there seems to be quite a variation in running speed, from timer to timer and day to day. The rudder is released by the 'Montreal' stop pin knocking away a pivoted arm covering the stop-pin-engagement-hole.





The method, is to trim the model on rubber that is past its prime to sort out the cruise portion of the climb. When this is done the burst can be trimmed using new motors, or to avoid waste, by increasing the number of strands on old rubber to obtain the initial burst.

The main problem I seem to have is getting the launch line correct, with this system a left biased throw produces a lovely hole in the ground!

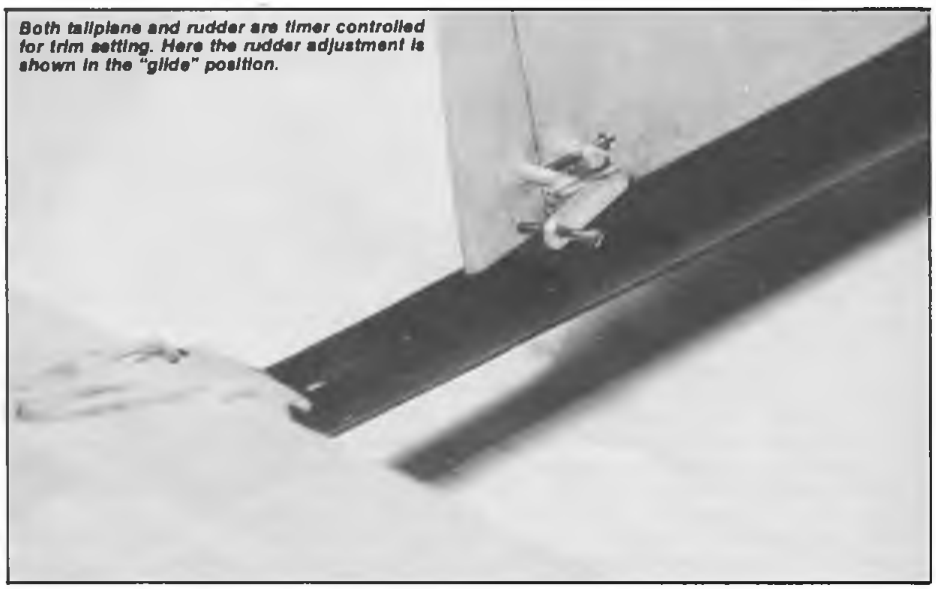
Competitive Flying

Much of the trimming and contest flying can be done on the bench at home! All systems should be checked and double checked to avoid failure on the field and any unwanted warps should be eliminated and watched. One aid, I believe, to consistency is to ensure that all surfaces are banded down securely and need I say the prop assembly should fit snuggly in place, nothing should flop about!

My latest models are as good as any...However, of late my flying of them has been rather below par. Apart from left baised launches, I've developed a knack of flying in the poorest air I can find. To detect lift I use both a bubble machine and a thermistor according to the weather. I prefer bubbles which unfortunately are only effective on those days that are warm and sunny with light drift and we don't get enough of these.

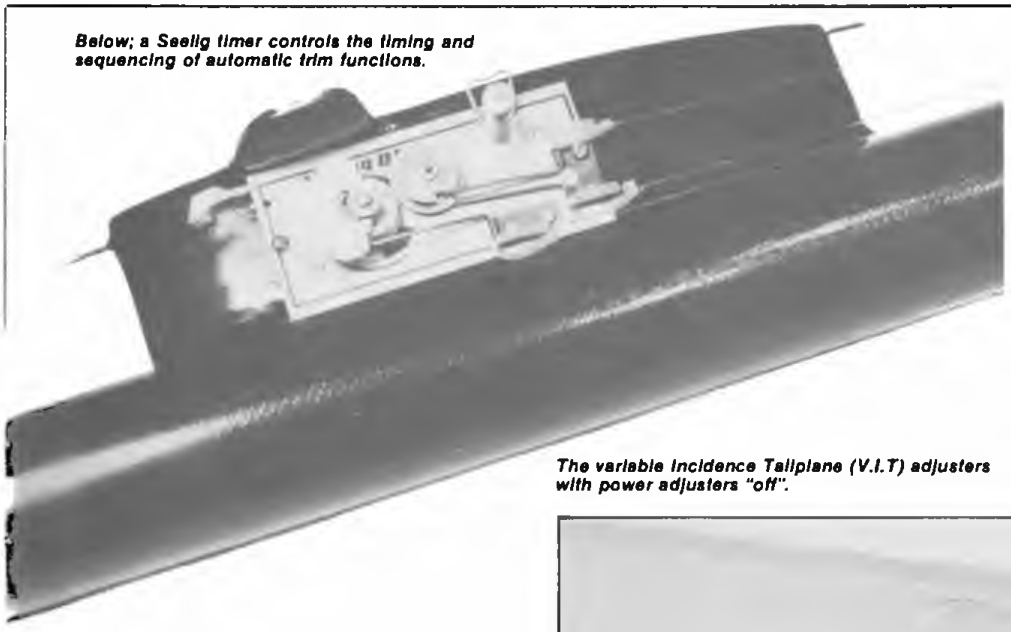
The Future

I cannot see any changes to the Wakefield specification happening and therefore few major design changes will emerge, just



Both tailplane and rudder are timer controlled for trim setting. Here the rudder adjustment is shown in the "glide" position.

Below; a Seelig timer controls the timing and sequencing of automatic trim functions.



The variable incidence Tailplane (V.I.T) adjusters with power adjusters "off".

detailed improvements. The development will be on props with emphasis on the use of *FAI* rubber now that *Pirelli* is no longer made, the torque output of this rubber being different to *Pirelli*, will mean the development of different propellers. My models will continue in the layout illustrated and I shall probably try to increase the aspect ratio by the reduction of the chord to 115mm with a structure similar to that described for 1984. I will also be trying out a delayed prop start system. This system should help get the launch angle better as well as enabling a harder throw!

One other feature I would like to try is a high aspect ratio sheet wing to see for myself whether or not it has any advantages. The major problem, on the face of it, will be in keeping the weight down whilst retaining sufficient strength.

Tailpiece

To ease some of the difficulty in obtaining materials and parts used in the construction of these models, they are available direct from the writer, including full size plans, prop units, jap tissue, glass cloth, epoxy, rubber, etc. The writer is also willing to enter into correspondence, discussion and exchange of ideas with other Wakefield flyers.

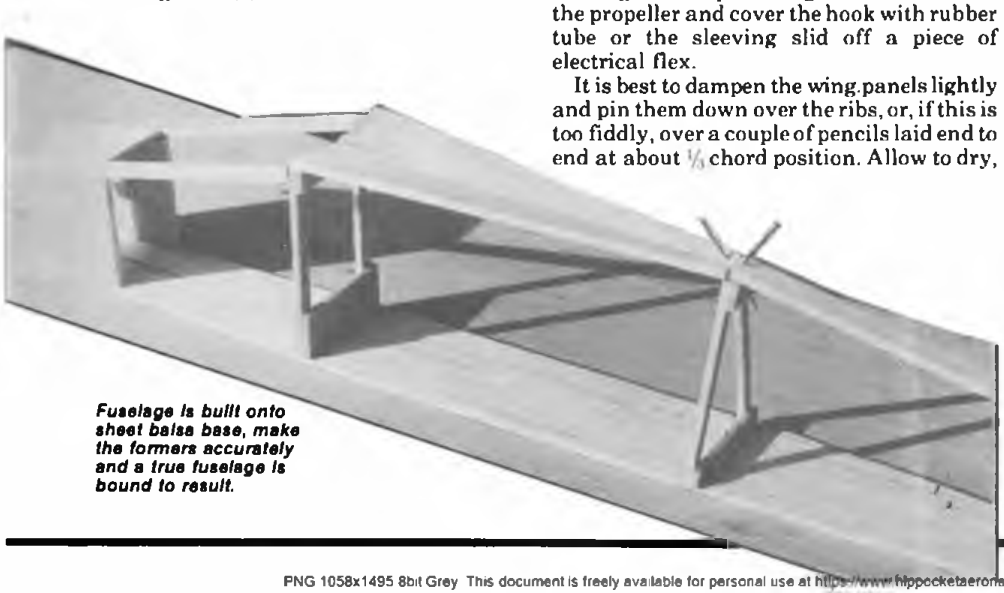
Mini-Minx

irregularities, then cover each side with one piece of tissue, with a third piece for the nose top. Lightly watershrink and . . . when dry, apply a thin coat of dope. Sand the tailplane and fin thoroughly and cement to fuselage, checking that they are exactly horizontal and vertical respectively. Add the sub-fin.

Drill for the motor peg (twirling the cocktail stick will probably do it) and cut the stick to length. Also drill just in front and behind the wing mount at a shallow angle and cut two pegs from the rest of the stick, cementing firmly as these take the wing retaining band(s). Laminate the noseblock from odd scraps of 1/16 in., making the rear lamination a good plug-in fit in the fuselage nose. Cement in a stub of 20 or 22g aluminium tube, or cement a cup washer on the front and rear to make a shaft bearing. Bend up a 22swg wire shaft to suit the propeller and cover the hook with rubber tube or the sleeving slid off a piece of electrical flex.

It is best to dampen the wing panels lightly and pin them down over the ribs, or, if this is too fiddly, over a couple of pencils laid end to end at about 1/3 chord position. Allow to dry, then cement the ribs in place, skewing pins through from the top so that the panels can be laid flat and the leading and trailing edges pinned down until the cement is thoroughly dry (overnight). Sand the roots to a close fit when one wing is flat on the board and the other has its tip raised 5½ in.

Unusual change of section from rectangular to triangular results in a pleasingly different appearance.



Fuselage is built onto sheet balsa base, make the formers accurately and a true fuselage is bound to result.

Cement them together thoroughly, leave to dry, the sand all over.

One loop of 1/4 in. rubber 10 in. long provides the power. Lubricate, then hook on to prop shaft and wrap a small rubber band or a couple of turns of knitting wool round. Find the other end and wrap this too, to leave a 1/4 in. dia. loop. Dangle down fuselage and find the loop with the motor peg. Attach wing with one modest rubber band doubled, or two small ones and check balance is about 1¼ in. behind leading edge at wingtips. (The original weighed 23 grams without rubber and balanced exactly right). Add a little plasticine or tape on a panel pin or small nail at nose or tail if necessary, then glide test. Try power flights with about 80-100 turns, breathing on rudder to warp it (or crack and cement it) if needed. Performance on 250 turns or so may well surprise you!

SHOP TALK

NEW MODEL HOBBY PRODUCTS REVIEWED

A very complete kit for an A1 glider from Graupner - distributed by Ripmax Models.

The Little Owl Flies Again

One of the greatest contests for junior modellers is run annually in Germany. "Der kliene UHU" (literally 'the little owl') is a competition for a specific A1 class of glider. It has given thousands of boys and girls, up the the age of 15, a chance to fly in this extraordinarily successful event. *Graupner* have recently updated their kit for "Der Kleine UHU" which is available in this country through *Ripmax* stockists at £12.25. The kit is very well presented, with diecut balsa components, shaped and notched wing leading and trailing edges, and a carefully thought out use of plastic. Wings are a tissue covered, built up structure whilst the tailplane is sheet balsa. The fuselage is of the 'pod and boom' type, with the 'pod' made of almost indestructable ABS plastic. The boom being a sturdy piece of straight grained pine. The kit is very complete, including rubber bands and all wire parts bent to shape.

Plastic is sensibly used for a number of parts that would otherwise cause problems to the novice. This is a kit that bridges the gap between the pure beginner's model and one for the experienced modeller. With clever constructional features, it gives the youngster (be he nine or ninety!) every opportunity to build a model that will fly. Plans are on two largish sheets, with all parts numbered and many detailed drawings to illustrate construction and flying. Instructions on the plan are in German, but English text is provided to tie in with circled numbers on the plan. Provision is made for a dethermaliser timer should you wish to fit one and auto-rudder is standard. An engine pod/pylon for *Cox* "Pee Wee" is available as a separate item as also are spare fuselage and plastic parts.

Ripmax Models offer a special discount deal for schools, youth groups or clubs, buying ten or more kits. Look out for "Der Kleine UHU" in your local model shop.

Books, books, books . . .

Building and Flying Control Line Aircraft by Dick Sarpolus, published by Kalmbach Publishing Co. ISBN: 0-89024-051-5. This is an American book and should be available in England at around £8.00. This is a paperback book of *Aeromodeller* size and has 64 pages. This may seem expensive, but for someone who has just discovered control line, it provides concentrated, practical information on the subject. The first four chapters cover such topics as control mechanisms, tanks, flight training and engines. Further chapters discuss tools, materials, construction, and building and modifying kits. A number of control line competitions are explained, to whet the newcomer's appetite for the future. Two plans, together with building instructions complete a thoroughly practical book — the plans are for a .09cu. in. stunt/sport trainer and a larger .35 cu. in. aerobatic model.

Left; Dick has written a number of aeromodelling books, his latest on C/L now published. Below; 'The Diving Eagle" by Peter Stohl also reviewed above.

The Diving Eagle by Peter W. Stahl, published by William Kimber. ISBN: 0-7183-0509-4. £10.50. Subtitled 'A Ju 88 Pilot's Diary', Peter Stahl was a young civilian test engineer when WWII broke out and was called up as a reservist. After training he was selected to serve with the first Luftwaffe unit equipped with the advanced twin engine Ju 88 bomber. His ability and achievements were instrumental in securing his promotion from reserve corporal to ending the war as commander of a special KG 200 detachment. Throughout this time he kept a diary which has resulted in this book. Presented as diary date entries the book holds the reader's attention throughout, the date breaks providing, if anything, a more impactive style.

Paper Flight by Jack Batermans, published by David and Charles Ltd. ISBN 0-7153-8591-7 £4.95. 'Take one piece of paper, fold it following the clear step-by-step instructions, and in no time at all your own model will be gliding and swooping through the air'. So states the introduction to Jack Bateman's book. 120 pages of paper models to surely please all tastes. Book size is 230mm x 367mm with patterns and folding instructions on almost every page. Until you have seen these pages you would not believe that so many different designs were possible. One or two are recognisable from misspent schooldays, others are fantastic to say the least. The author subdivides the book into various categories of design: Fantasy flyers, Genuine reproductions, (Tiger Moth, Mirage, etc), Experimental models, Competition craft, Birds (Eagle, Wild Duck, etc) and finally Insects. Even if you have never felt like folding paper to this end before — put this book on your Christmas present list, you won't regret it.

"Paper Flight" provides the means whereby all the family can enjoy aeromodelling with some novel designs.

Speedy big'un

Tigre Engines of Watford often have some interesting items in stock. Their latest offering is the *Super Tigre* X.40 speed motor. As can be seen from the photograph this has rear induction and exhaust. What cannot be seen, is the ABC piston assembly or the fact that the rear venturi may be mounted in one of two positions. This latter point, although not desperately exiting does allow some flexibility in engine mounting. The X.40 comes complete with speed venturi, ⅛in. BSW pressure nipple and exhaust manifold for connection to a tuned pipe. Claimed output is 1.75 brake horsepower at 17000 r.p.m. Speeds of over 200 m.p.h. have been recorded with the .29cu. in. version . . . so *Aeromodeller* is avidly waiting to hear what you do with the 40! Price is a very competitive £49.50 from *Tigre Engines*, Unit 10, Paramount Estate, Sandown Road, Watford, Herts., WD2 4NV.

Below; Super Tigres latest, the X40 rear/rear, ABC racing motor with excellent pedigree.

Going Solo

Part 8 Next steps — John Watters describes building models from plans. Focussing on a free-flight classic — The Tomboy

IF YOU HAVE been following the articles for beginners to aeromodelling by Trevor Faulkner over the preceeding months, you should by now have a reasonable knowledge of handling balsa wood etc., and a basic knowledge of how models are trimmed and perform. In this and the next article. I hope to introduce you to another facet of building model aeroplanes (and one which I still find most satisfying) namely — building from a plan. That is, a plan purchased out of the excellent collection in the Aeromodeller Plans Handbook. Going one stage further — I shall describe the building of what for many modellers is still a very satisfying part of aeromodelling, i.e. a Free Flight Power Sports Model.

The model that has been chosen, is a long term favourite with modellers — even more so now with the accelerating interest in vintage model flying — the simple, sure flying . . . 'Tomboy'.

First a little bit of background history on the 'Tomboy'. Designed by Vic Smeed, and first published in *Aeromodeller* November 1950. For those people lucky enough to have a copy of that issue, the model was also depicted on the cover rising from a water take-off in a painting by the late Rupert Moore. Enough of nostalgia — back to the plan.

We shall take it that you have obtained your plan and have studied it. Time spent looking at the drawing before starting to build will always be time well spent. One of the particular reasons, we will assume for you having chosen the 'Tomboy' is that the particular engine you have is suitable to power the model, i.e. a motor between 0.5 and 1.5 cc and preferably a diesel engine. For a beginner into free flight power a diesel is much easier to control for power output.

Anyone who has not built a free flight power model from a plan before, may on receiving the plan be surprised to see that the engine, or engines, shown on the plan are no longer available from the model shops. This is not to say that these engines are unobtainable, most still are, but at a *price*. The motors shown on the 'Tomboy' plan are the *Mills* 0.75cc, *E.D.* 'Bee' 1 cc and the *Elfin* 1.49 cc. Now as a beginner to free flight power modelling the chances of you having one of these particular engines is probably slim. Nevertheless for us lesser mortals, there are plenty of good reliable small diesel engines readily obtainable in most model shops. If as yet you don't own a motor, chose one within your price range, and between 0.5cc and 1cc. Look at the advertisements in this magazine and you will get a good idea of what is available. If you already have your motor, you should be conversant with it's running. It is much better to know your motor's habits before fitting it into your model.

General assessment

Looking at the 'Tomboy' plan we see that the spacing given for the engine bearers is drawn to suit the *E.D.* 'Bee' engine. Now assuming you are not using this particular motor you will have to modify this spacing to suit your motor. Before you cut out any formers which support the engine bearers, you should mark out the positions of the engine bearers to suit your particular enginel. (fig 1).

Included in the 'Tomboy' plan and many others, you will find a materials or parts list. These lists, stipulate the amount of material you will require to make your particular model, not leaving you much room for error. If as yet, you have not built up a stock of balsa, it will probably pay you (depending upon your pocket money) to buy one two extra strips of the required sizes. Even if you do not need to use them on this model, they will form the basis of your future balsa stock.

The lengths of some of the materials quoted in these lists, are usually the 'basic' amounts required but remember you will probably only be able to obtain them in the nominal lengths and sizes stocked by your local model stop. When I first started modelling (a long time ago . . . Ed), the local model shop would even cut and sell half a sheet of 1/32 in. balsa and fill a jam jar full of dope!

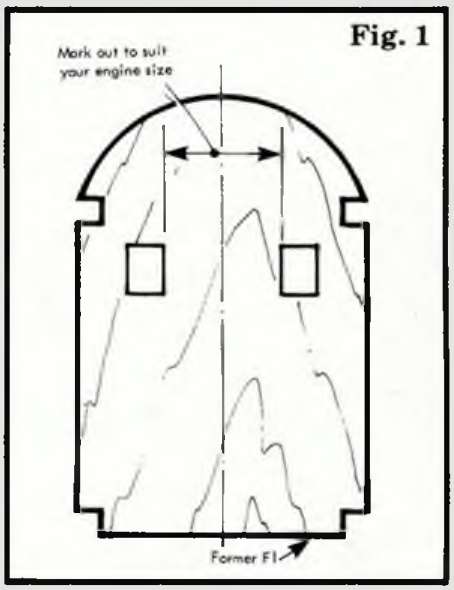
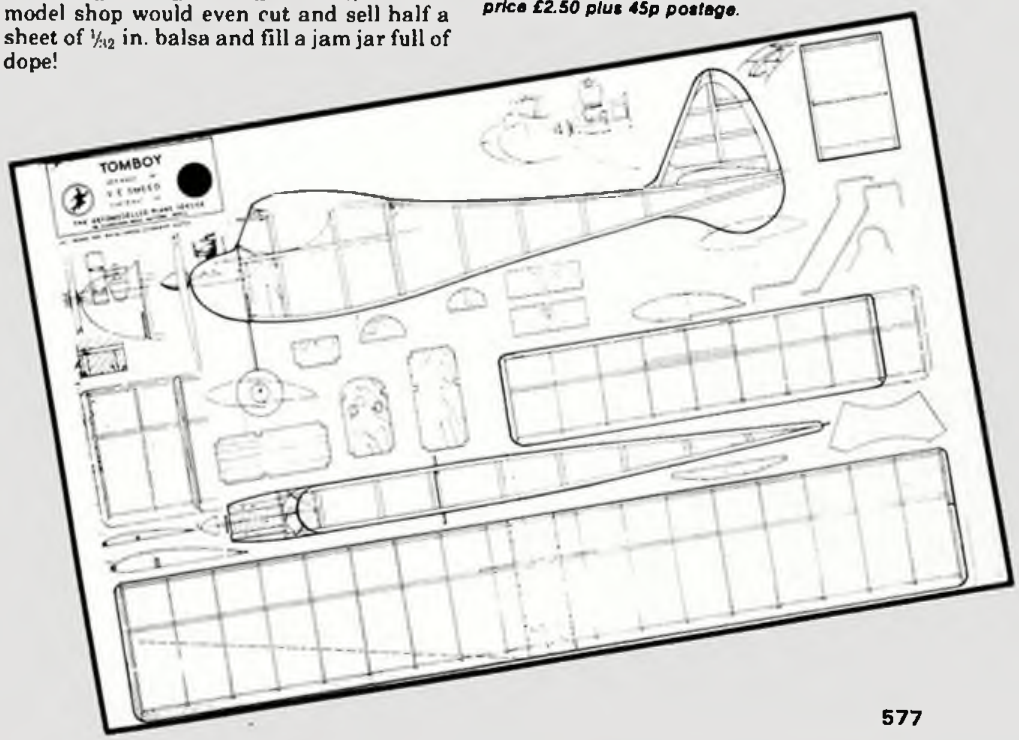


Fig. 1

As Trevor Faulkner described in Part One of these articles (April 1984), if you are not sure how to select the right grade of wood, take you plan along to your model shop and ask their advice.

Below; full-size copies of the plan shown here are available from Aeromodeller Plans Service (as plan PET 398) P.O. Box 35, Wolsey House, Wolsey Road, Hemel Hempstead Herts HP2 4SS price £2.50 plus 45p postage.



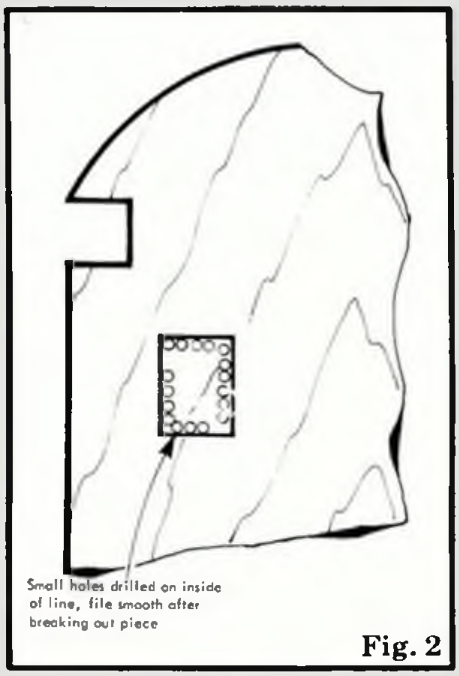


Fig. 2

Building

Let us now assume that you have obtained all the necessary building materials and if you have been following these articles, some tools and odds and ends. I always like to start any new model by first cutting out all the necessary parts. This can be one of the slowest parts of building any model but unless done properly, one which can mean the difference between success and failure.

You will probably by now, be familiar with how to mark out parts from a drawing onto the wood. Although there are many different ways of doing this i.e. pricking through the plan with a pin, cutting out the shapes from the plan and pasting onto the wood and tracing from the plan onto the wood . . . the choice is yours. Try them all, one will suit you best. However, the best method of making wing and tail ribs and the most accurate,is to make two thin plywood rib templates. Using one of the templates, cut out, slightly oversize, all the ribs, then by sandwiching the balsa ribs between the ply templates and pinning through from both sides, sand the balsa ribs to the template size. Now by using a fine saw or small hacksaw, make a cut through all the ribs, at each side of the spar slot; and knock out the pieces, to form the slot. This method can also be used to form the leading edge notches.

When marking out the fuselage formers onto your balsa and ply, take note to see that the grain of the wood corresponds to the way it has been shown on your plan. For cutting plywood, a fine fret-saw is best but it *can* be cut with a modelling knife or safety razor blade. I have even used a large pair of scissors to rough out a part from thin ply. If using either a knife or blade, make sure you use a metal straight edge and repeatedly cut along the same line until you are through the wood. Don't be discouraged if you don't make a professional job of cutting out ply parts, it will come with practice! Cutting holes in plywood, such as for engine bearers, are made by first drilling a series of small holes, about 1/16 in. dia close together on the inside of the 'hole line' (fig 2). Then by breaking or cutting out the pieces to form the hole, using a small file to smooth the rough edges. Try the engine bearers into the holes for fit, they should not be too loose — just a push fit. With this type of model it doesn't matter which part you start to build first but I shall begin with the fuselage.

Fuselage

Lay out the plan over your building board. I usually pin it down around the area to be worked on. Make sure that there are no creases or ridges still in the plan from where it was folded. It's not a bad idea to iron the plan on the reverse side using a cool heat setting. Cover over the fuselage area with thin clear polythene sheet and pin it down. This type of open fuselage construction may possibly be new to you, but don't be deceived by thinking it is not strong.

From your pieces of 1/16 in. sq. balsa, choose five lengths of medium hardness, from these select four to use as the top and bottom longerons. Before pinning down the bottom longerons, soak in warm water for about 20 minutes, this will make it more pliable and will take on a permanent set when dry i.e. the bottom fuselage curve. Pin the bottom longerons down over the plan, staggering the pins on either side of the strip, not through it. The top longerons should be cracked at the wing trailing edge position — but try not to actually break the strip (fig 3). Leave longerons about 1/2 in. longer than fuselage. Add all the spacers and gussets and allow to set. When this is complete, the second fuselage side should be built directly over the first. Do this while the pins used to build the first side are still in place, this way both sides will be identical but be careful not to glue the two halves together.

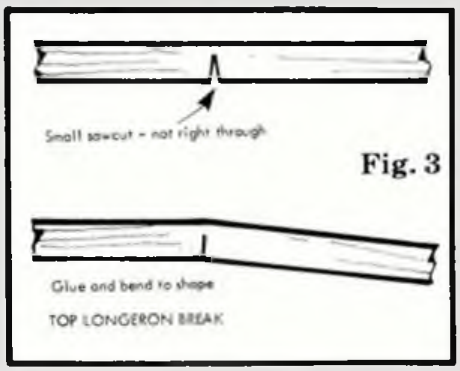


Fig. 3

Remove the pins and with a blade or knife, slice between the two frames to part them, being careful not to cut into the wood! Formers F3 and F4 should now be glued to one of the sides, making sure that they are square to the side. When set, add the second fuselage side. After this stucture has completely dried, it should be pulled together at the tail and glued, holding with either clothes pegs, tape or elastic bands. Make sure that the sides are pulled together true and not twisted (fig 4). Position the structure over the plan view of the fuselage,

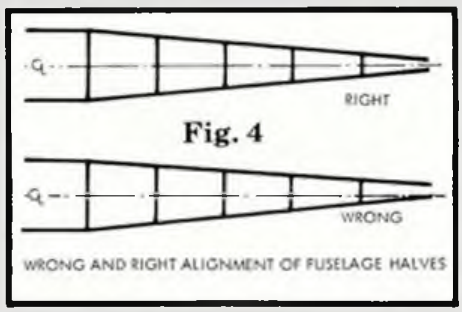


Fig. 4

this will give you a good idea of how it should look. Add the remaining top and bottom spacers and allow the structure to set.

Although the 'Tomboy' is convertable to a floatplane, I think that at this stage it would be better to stick to the conventional wheeled version. When bending the undercarriage wire, start in the middle of the piece of wire and bend the shape equally about the centre, rather than starting from one end! Keep offering the shape up to the plan as you bend it until you are satisfied. This may well be the thickest section piano wire you have come across up to now, so you will need strong pliers. With this thickness of wire, don't try to cut the wire with pliers, either saw it with a hacksaw or use a small file.

You will see that on the plan, former F1 has small crosses marked on it, these indicate the drilling holes for the undercarriage binding. Because you may not have formed your undercarriage exactly as shown on the plan, place your undercarriage onto formers F1 and mark *your* hole positions to suit. Drill through F1 using a drill no larger than 1/16 in. dia and bind the undercarriage to the former using strong thread, finally coating the thread with glue.

Mark off from the plan the length for the engine bearers and cut them to size. Mark onto them the position for the engine fixing bolts. Your engine instructions, may tell you what size of bolts to use — probably 8 BA for which a 1/8 in. dia drill is about right. Drill the bearers making sure that the holes are vertical. To make sure you have got the holes correct, bolt your engine in position and see that the ends of the bearers fit into the holes in F1. To obtain the required engine side thrust, push the right hand bearer (as viewed from the top) about 1/16 in. further in F1. When satisfied, liberally glue the bearers on either side of F1 — use a P.V.A. glue or epoxy for this. While the former and bearers are setting they should be held so that they do not move. When dry remove the engine and glue former F1 to the front of the fuselage and trim the strips to length.

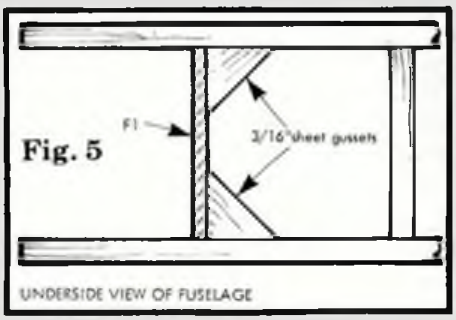


Fig. 5

Finish off the fuselage by adding the side and bottom sheeting or alternatively gussets (fig 5), plus the curved sheet pieces at the cabin windows. The covering over the top of formers F1 and F2 can be made from thin card. Position the 1/4 in sheet side cowlings to see how much, if any, side packing is required on the outside of the engine bearers. Finally glue the cowlings in place. The sheeting between the lower half of the side cowling can be omitted if you wish or at least leave a hole between the sheeting and F1, to allow the unburned oil which will collect, to drain off. Glue in place the cross laminated cabin top plus the

sheeting at the tail . . . and the fuselage structure is complete.

The windshield should be cut from thin acetate sheet. I find this a much better material than celluloid, being easier to attach to the balsa structure. A simple test for acetate sheet is to apply either dope or balsa cement to a piece and see whether it sticks to it, balsa cement when dried usually peels off celluloid! To cut out the pattern place the sheet over the plan and using a felt tip pen trace the pattern onto the acetate. Cut out the shape using either a pair of scissors or a sharp blade.

Tailplane and Fin

The tailplane is a very simple structure and should pose no problems, the only thing to remember is to cut the slot in three of the ribs for the ⅛ in. sq. short spar. Or if you prefer cut the top slot in all the ribs and add the spar full length.

The fin and trim-tab should be built all together as one unit, with the trim-tab being cut free after the structure has set. Attach the trim-tab to the rudder by using small pieces of thin aluminium (fig 6).

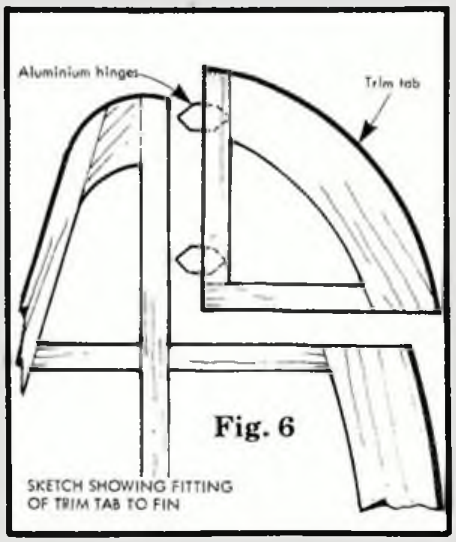


Fig. 6

SKETCH SHOWING FITTING OF TRIM TAB TO FIN

Wing

Before starting construction on the wing, you can if you wish, make a modification to the design. From past experience wings with single bottom spars, if not covered and doped with care, develop what is known as eliptical dihedral (fig 7). This condition can be overcome by either, being very careful or by adding on additional top spar (fig 8). This is purely an option and if you wish to modify the wing, pin all the wing ribs together before cutting out the notch for the top spar.

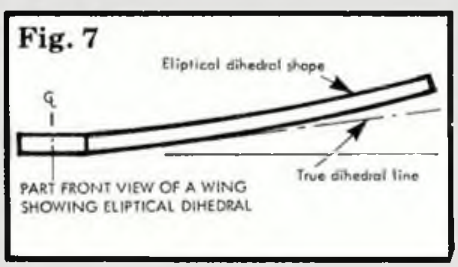


Fig. 7

PART FRONT VIEW OF A WING SHOWING ELIPTICAL DIHEDRAL

On four of the wing ribs increase the size of the bottom spar slot to accept the plywood dihedral brace. Also from two of the same ribs, 1/16 in. should be removed from the top edge to allow the top centre section sheeting to be fitted.

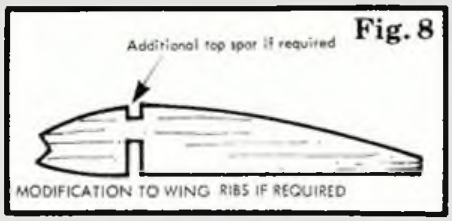


Fig. 8

MODIFICATION TO WING RIBS IF REQUIRED

Finishing

Having now completed construction, go over everything to see that no parts have been damaged, or come loose. Smooth the structure down with fine sandpaper to remove any lumps and rough edges. At this stage it is as well to assemble the model and check that all parts fit, especially that the wing and tailplane lie true to the fuselage and each other.

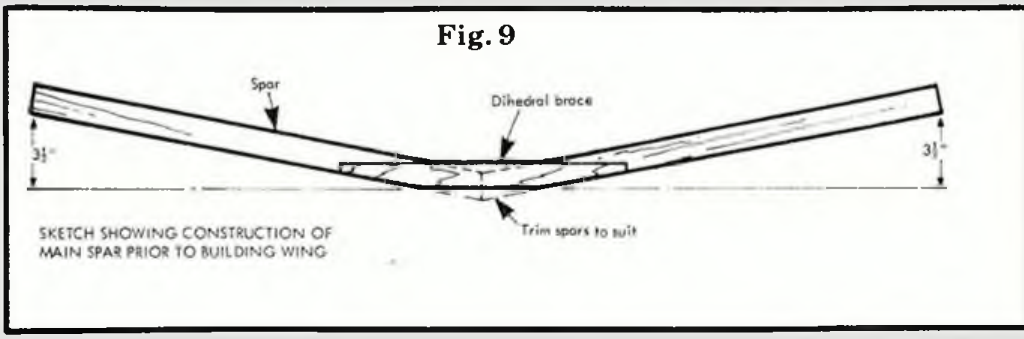


Fig. 9

SKETCH SHOWING CONSTRUCTION OF MAIN SPAR PRIOR TO BUILDING WING

To build the wing, first construct the main bottom spar as one piece (fig 9). When this has set, pin one half of it down over the plan, leaving the other half and centre section *propped up* (fig 10). Pin the trailing edge down and add all the ribs to that side of the wing. Now add the hard 1/16in. sq. leading edge. After the first wing half has dried, remove from your board and repeat for the other half.

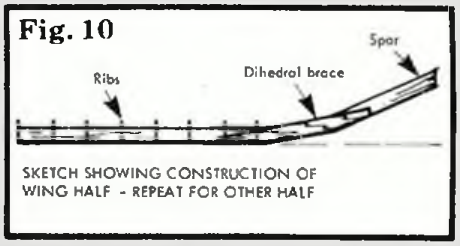


Fig. 10

SKETCH SHOWING CONSTRUCTION OF WING HALF - REPEAT FOR OTHER HALF

Construct the centre section by pinning down the centre section portion of the main spar over the plan and prop up both wing tips. Fit leading and trailing edges and add the remaining wing ribs. An additional detail which can be added at this stage and was actually added to the original model but not not shown on the plan — is to add 1/16 in. sheet gussets on both sides of the ribs at the dihedral joint (fig 11). To complete the wing,

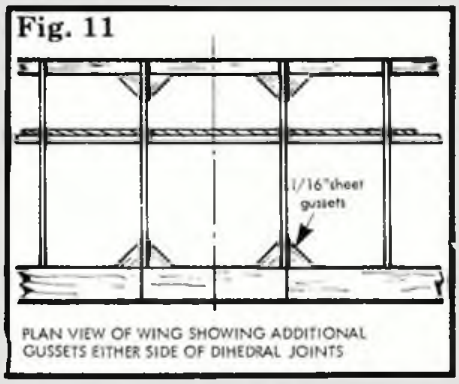


Fig. 11

PLAN VIEW OF WING SHOWING ADDITIONAL GUSSETS EITHER SIDE OF DIHEDRAL JOINTS

add the centre section 1/16 in. sheet covering — remember to cover with the grain of the sheet running with the length of the wing. Now check over the whole wing to see if there are any loose joints . . . it won't harm to go over each joint, especially at the main spar, with a spot of glue. If you decide to add the top spar to the wings this should be done when building up each section.

Covering the open structure wings has been covered in earlier articles, so I will not elaborate in great detail. For this size and type of model, lightweight tissue will be quite adequate but for a stronger finish heavyweight may be used. Before covering, a mixture of dope and thinners about 70% dope and 30% thinners should be brushed on all parts. Lightly sand after the dope has dried. Apply the tissue to each part of the structure using a 50:50 dope thinners mixture (plus castor oil as plasticiser about 20 drops/ounce), as the tissue adhesive. Pulling the tissue taut over each part as you apply it.

The fin should be covered as one unit, including the trim tab, the tissue can be slit at the joint lines after completing final doping. Before finally doping the model the fit of the tailplane and fin should be checked. The fin is designed such that it fits onto the fuselage and allows the tailplane to pass through, for removal and transport. When satisfied with the fit glue the fin to the fuselage. Before doping, the tissue should be lightly water sprayed to take up the initial tension. Final doping should be carried out in a warm room, using a soft brush, about ½in wide, with a mixture of 50% thinners. Give one coat of this dope mixture to each part of the model. Then with a new mixture of 30% dope, 70% thinners (to which is added castor oil) give a further coat to the wings and tail and a further two coats to the fuselage.

If after all the parts have been doped, there are any warps in the tail and wings, these can be removed by holding them in front of either a steaming kettle or electric fire and applying a twisting force in the opposite direction to the warp, until the tissue slackens. Now whilst still holding the part, remove it from the heat until the tissue re-tightens and the warps are removed. If not repeat with a stronger twisting force.

Hopefully your model is complete, add any decoration you may wish but be careful not to add a lot of weight, especially if you are decorating with coloured dopes or paints.

Finally, fit in your engine and assemble the model, checking again to ensure that the wings and tail are true. Hopefully you have a very fine model ready to be flown. Next month I will cover how to achieve that, and hopefully keep your model in one piece.

Model Shop DIRECTORY

READERS PLEASE NOTE: Due to soaring postal charges many retailers are unable to answer postal enquiries unless accompanied by a stamped addressed envelope ★ **Mail Order Welcome.**

AUSTRALIA

MELBOURNE 3000 Tel (347)
RIVERSIDE HOBBY CENTRE 8029
16 LITTLE LATROBE STREET ★
9 am-5 30 pm Mon -Fri
9 am-12 noon Sat

AVON

BRISTOL Tel (0272) 694541
THE MODEL AIR-PORT
134 GLOUCESTER ROAD NORTH,
FILTON
Open Mon -Sat 9am to 5pm

BERKSHIRE

WINDSOR Tel (07535) 56321
WINDSOR MODEL SHOP ★
45 ALBANY ROAD
Open Mon -Sat 9 am-6 pm
Late night Fri 7 pm
Half day Wed 1 pm

CAMBRIDGESHIRE

CAMBRIDGE Tel (0223) 359620
MODEL MANIA ★
17 KING STREET
Open 9 30 am 5 30 pm
Mon Sat Inc Lunchtime

CHESHIRE

SALE Tel (061 962) 4561
HOBBYWORLD ★
200A MARSLAND ROAD
Mon -Sat 9 30 6 00
Closed all day Wednesday

DEVON

TORBAY Tel (0803) 521767
MANSEL S MODELS ★
PALACE AVENUE PAIGNTON
Open 9 15 am 5 30 pm Mon Sat
inclusive Closed all day Wed
Late night Fri 7 pm

DORSET

BOURNEMOUTH Tel (0202)
R F AUSTIN MODEL 424038
SHOP 156 SEABOURNE ROAD ★
SOUTHBOURNE BH5 2JA
Open 9 am 5 30 pm Mon Sat
Closed 6pm Thurs Fri Half day Wed

ESSEX

CHELMSFORD Tel (0245)
CHELMSFORD 352553
MODEL CO LTD
204 MOULSHAM STREET
Mon Sat 9 00am 5 30pm

HORNCHURCH Tel (040 24)
RADIO ACTIVE 40016
94 ARDLEIGH GREEN ROAD ★
Open Mon Tues Thurs & Sat
9 am-6 pm Fri 9 am-7 pm
Half day Wednesday

HAMPSHIRE

FAREHAM Tel (0329) 234136
G M H BUNCE & CO LTD ★
206 WEST STREET
Open 9 am 5 30 pm Closed Wed

SOUTHAMPTON Tel (0703)
EASTLEIGH MODEL 617849
CENTRE ★
2e HIGH STREET, EASTLEIGH
Open 9 am-6 pm
Closed all day Wed

HERTFORDSHIRE

ROYSTON Tel (0763 45375)
MODEL WORKSHOP ★
31 KNEESWORTH STREET
SG8 5AB
Open Tues -Sat 9 30 am-6 00 pm
Late night Friday 9 30 am-8 00 pm

HONG KONG

HONG KONG Tel 3-680507
RADAR CO LTD ★
3 OBSERVATORY ROAD
TSIMSHATSUI, KOWLOON
Open 10 am-7 pm Closed Sundays

HONG KONG Tel 3-684184
WINNING MODEL & HOBBY
SUPPLIES
2a AUSTIN AVENUE
KOWLOON, HONG KONG
Open 10 am-7 pm Closed Sundays

KENT

BEXLEY Tel (0322) 522308
BEXLEY MODEL CENTRE
18 BOURNE ROAD
Mon -Sat 9 00-5 30
Thursday closed all day

TUNBRIDGE WELLS Tel (0892)
E M MODELS 36689
42 CAMDEN ROAD ★
Mon -Sat 9 am-5 30 pm
Closed Wed

LANCASHIRE

FARNWORTH Tel (0204) 74688
JOYCRAFT ★
3 BOLTON ROAD MOSES GATE
Open Mon -Sat 9 am-6 30 pm
Closed all day Wednesday

LIVERPOOL Tel (051 709) 8039
STAN CATCHPOLES ★
MODEL WORLD
85 BOLD STREET
9 30 am 5 30 pm Six days

MANCHESTER Tel (061 834)
THE MODEL SHOP 3972
(MANCHESTER) ★
209 DEANS GATE
Mon Fri 9 30 am-6 pm
Sat 9 am-5 pm

PRESTON Tel (0772) 51243
PRESTON MODEL CENTRE LTD ★
(Opposite Polytech)
2 FYLDE ROAD
Open 9 30 am 6 pm Mon Sat

WIGAN Tel (0942) 45683
G FORSHAW & SON ★
58 MARKET STREET
Open 9 15 am-5 45 pm
Early Closing Wednesday

LEICESTERSHIRE

HINCKLEY Tel (0455) 30952
PUNCTILIO MODEL SPOT ★
6 WATERLOO ROAD
Mon 9 15 am 7 pm Tues, Wed,
Thurs 2pm 7pm Fri 9 15 am 7pm
Sat 9 15 am-5 pm

LONDON

CAMDEN TOWN Tel 01 485
AERONAUTICAL MODELS 1818
39 PARKWAY NW1 ★
9 15 am-5 30 pm Tues -Fri
9 15 am-5 pm Sat
Closed all day Monday

ELTHAM Tel 01 850 4324
ELTHAM MODELS ★
54 WELL HALL ROAD SE9
Mon -Sat 10 am-5 30 pm
Closed Thursday

LONDON Tel: 01-205 0817
AEROMODEL MART ★
165 Church Lane, N.W.9.
Open 9.00am - 5pm Tues. Wed. Sat.
9.00am - 7.30pm Thurs. Fri.
Closed all day Monday.

LONDON Tel (01-228) 6319
E F RUSS
BATTERSEA RISE SW11
Open 9 a m -6 p m
Early closing Wednesday 1 p m

LONDON Tel 01-703 4562
MODEL AIRCRAFT SUPPLIES LTD
207 CAMBERWELL ROAD, SE5 ★
Open Mon -Sat 10 am-6 pm
Fri 10 am-7 30 pm
Closed all day Thursday

LONDON Tel 01-607 4272
HENRY J NICHOLLS & SON LTD ★
308 HOLLOWAY ROAD, N7
Open Mon -Sat 9 am-5 30 pm

MIDDLESEX

HARLINGTON Tel 01-897
RADIO CONTROL MODEL 2326
CENTRE 214 HIGH STREET ★
Mon Tues Thurs & Sat 9 15 am
5 30 pm Fri 9 15 am 6 30 pm
Closed Wednesday

HARROW Tel 01-863 9788
THE MODEL SHOP
190-194 STATION ROAD
Mon -Sat 9 30-6 00
Wednesday 9 30-5 00

NORFOLK

KINGS LYNN Tel (0553) 62439
BARNEY'S MODEL SHOP
1ST FLOOR, 29 ST JAMES STREET
PE30 5DA
Opening hours 9 00-5 30 Tues -
Sat Closed Monday

NORTHANTS

NORTHAMPTON Tel (0604)
STAGG MODELS 35718
22 BRIDGE STREET ★
Open 9 am-5 30 pm
Early closing 2 pm Thursday
Late night opening Friday until 7 pm

NOTTINGHAMSHIRE

NOTTINGHAM Tel (0602)
GEE DEE MODELS LTD 412211
19 21 HEATHCOTE STREET ★
OFF GOOSEGATE
Open 9 30 am 5 30 pm
Early closing Thursday

OXFORDSHIRE

OXFORD Tel (0865) 42407
HOWES OF OXFORD ★
9-10 BROAD STREET OX1 3AJ
Open 9 00 am-5 15 pm
6 day week

SCOTLAND

GLASGOW Tel (041 221) 0484
DUNNS MODELS ★
3 WEST NILE STREET
Open Mon -Sat 9 00 am-5 30 pm

PERTH Tel (0738) 24540
DUNNS MODELS ★
29 SCOTT STREET
Mon -Sat 9 00-5 30
Wednesday Closed

STAFFORDSHIRE

WOLVERHAMPTON Tel (0902)
WOLVERHAMPTON 26709
MODELS & HOBBIES ★
BELL ST, MANDERS CENTRE
9 am-5 30 pm Mon -Sat
Early closing Thursday

SURREY

ADDLESTONE Tel (0932) 45440
ADDLESTONE MODELS LTD ★
63 STATION ROAD
Open 9 am 6 pm Closed all day
Wed Late night Fri 6 30 pm
24hr Answerphone service

NEW MALDEN Tel 01-942
MICK CHARLES MODELS 0012
33 COOMBE ROAD
Mon., Tues., Thur., Sat. 9.30-5.30
Fri. 9.30-8.00
Closed all day Wednesday

SUSSEX

BRIGHTON Tel (0273) 418225
HARRY BROOKS *
15 VICTORIA ROAD
PORTSLADE
Open every day except Sun.
8.30 am-5.45 pm (no half day)

CRAWLEY Tel (0293) 21921
HEATHER CRAFT *
9 SOUTHGATE PARADE
SOUTHGATE RH10 6ER
Open 9 am-5.30 pm Mon.-Sat.
Closed all day Wednesday

EAST GRINSTEAD Tel (0342)
SOUTH EASTERN MODELS 21750
5 THE PARADE
LONDON ROAD, FELBRIDGE
Open Mon.-Sat. 9.30 am-5.30 pm
Closed Wednesdays

WORTHING Tel (0903) 207525
SUSSEX MODEL CENTRE *
10 TEVILLE GATE
9 am-5.30 pm Open six days a week
Monday to Saturday

TYNE AND WEAR

NEWCASTLE UPON TYNE
Tel (0632) 322016
THE MODEL SHOP *
18 BLENHEIM STREET
Mon. Sat. 9am-5.30pm
Closed all day Wednesday

WALES

CARDIFF Tel (0222) 31367
THE CARDIFF MODEL CENTRE *
34 LLANDAFF ROAD
CANTON, CARDIFF
Open 9.00-5.30 5 days a week
Closed all day Wed

CARDIFF Tel (0222) 29065
BUD MORGAN *
22 CASTLE ARCADE
SOUTH GLAMORGAN CF1 2BW
9 am-5.30 pm

WEST MIDLANDS

BIRMINGHAM 10 Tel 021 772
BOB S MODELS 4917
520-522 COVENTRY ROAD *
SMALL HEATH
Open 9.30 am-6 pm
Early closing Wed 1.30 pm

WILTSHIRE

MELKSHAM Tel (0225) 703311
MELKSHAM MODELS
19 BATH ROAD
Mon., Tues. and Thurs. 9 a.m.-
5.30 p.m. Wed. closed all day. Fri.
9 a.m.-6.30 p.m. Sat. 9 a.m.-5 p.m.

YORKSHIRE

BARNSLEY Tel (0226) 43561
DON VALLEY SPORTS *
28 NEW STREET
Open 9 am-5.30 pm Mon.-Sat.
Closed Thursday

BRADFORD Tel (0274)
MODELDROME 726186
217 MANNINGHAM LANE *
BD8 7HH
Opening hours 9.30am-5.45pm
Closed Wednesday

DONCASTER Tel (0302)
EVANS MODEL CENTRE 27255
D. C. EVANS & CO. (HOLDINGS) *
LTD. 65 SILVER STREET
Open Mon.-Sat. 9 am-5.30 pm
Closed all day Thursday

KEIGHLEY Tel (0535) 65662
AIREDALE MODELS *
156 STATION BRIDGE
BRADFORD ROAD
Mon.-Sat. 9.30-6 Tues. closed
Thur. 9.30 am-7 pm

LEEDS Tel (0532) 646117
FLYING MODELS *
88 CROSSGATES ROAD
CROSSGATES
Mon.-Sat. 6 am-6 pm
Sun. 8 am-1 pm

YORK Tel (0904) 34281
DAVE SMITH MODELS *
17 DAVYGATE CENTRE
DAVYGATE
Open Mon.-Sat. 9 am-6 pm
No half day

NORTH YORKSHIRE

KNARESBOROUGH Tel (0423)
JH AERO MODELS 866096
57A HIGH ST. (above Kitchen Centre)
Mon.-Fri. 9.30 a.m.-5.30 p.m.
Sat. 10.00 a.m.-1.00 p.m.
Late night Friday till 7.30 p.m.

** Shops offering a mail order service are denoted in this Guide by an asterisk.*

How to get the most from your advertisement in

AERO MODELLER

Give a full description of the product or service which you want to sell.

Book a *series* of advertisements to ensure that you reach the whole potential market. Remember your customer could quite easily miss the issue which contains your advertisement.

If you want to cancel your advertisement then simply pick up the phone before copy deadline and tell us.

Lastly, to get the most from your advertisement consult us first.

We are here to help you – Tel: (01-437) 0699 and ask for Ian Atkinson.

AERO MODELLER

CLASSIFIED

Private and trade rate 25p per word; minimum £5.00. Display box rate £6 per single column centimetre (minimum size 2.5cm £15.00; maximum 5cm £25). All advertisements are inserted in the first available issue, unless specified otherwise.
Write your advert in BLOCK CAPITALS in the grid below, ticking the section you wish it to appear under, INCLUDING YOUR NAME AND ADDRESS IN THE WORD COUNT and send it to: AEROMODELLER, ADVERTISEMENT DEPARTMENT, ARGUS SPECIALIST PUBLICATIONS LTD., 1 GOLDEN SQUARE, LONDON W1R 3AB. Tel: 01-437 0699

☐ FOR SALE ☐ WANTED ☐ GENERAL ☐ SERVICES ☐ BOOKS & PUBLICATIONS

advertisements

ALL CLASSIFIED ADVERTISEMENTS MUST BE PRE-PAID. THERE ARE NO REIMBURSEMENTS FOR CANCELLATIONS.
I enclose my Cheque/Postal Order* for £_____ for_____ insertions, made payable to Argus Specialist Publications Ltd.
(*Delete as necessary)

Name .....
Address .....
.....
.....Post Code.....
Signature.....Date.....

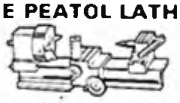
IF YOU DO NOT WISH TO CUT YOUR MAGAZINE PHOTOCOPY THIS FORM

CLASSIFIED advertisements

Private and trade rate 25p per word, minimum £5.00. Display box rate £6 per single column centimetre (minimum size 2.5cm £15.00). All advertisements are inserted in the first available issue, unless specified otherwise.
Write your advert in **BLOCK CAPITALS** indicating the section you wish it to appear under **INCLUDING YOUR NAME AND ADDRESS** and send it to **AEROMODELLER, ADVERTISEMENT DEPARTMENT, ARGUS SPECIALIST PUBLICATIONS LTD., 1 GOLDEN SQUARE, LONDON W1R 3AB. Tel: 01-437 0699.**

For Sale

THE PEATOL LATHE



£120 including 3 or 4 jaw chuck. Milling attachment and other accessories available. Centre height 2", distance between centres 9".
Please send S.A.E. for full details.
Peatol Machine Tools, 19 Knightlow Road, Harborne, Birmingham B17 8PS. Price inc. VAT

We are the officially approved service agents for Austro-Webra, Cipolla, Cox, D.C., Enya, Fox, Fuji, HB, HGK, HP, Merco, Meteor, PAW, Saito, Super Tigre, Retail Dealers for OS, Irvine, ED. 20,000 plus spares always in stock. 777 service (7a.m.-7p.m. 7 days a week). Motors, accessories, spares, repairs, overhauls. Express service. Access, Visa. John D. Haytree, The Haven, Rixey Park, Chudleigh, Devon TQ13 0AN. Tel. (0626) 852330. T/C

NOW AVAILABLE 1984 CATALOGUE 95p POST FREE
Exports Tax Free Catalogue £2.50—S/M
Engines, kits and accessories by Ripmax, Graupner, Keil Kraft, DPR Veron, Modelhob, Comet, Guillows, P.A.W. D.C. Merco, Enya, OS, Cox, Telco, Balsawood, Tools.
S. H. Grainger Ltd., 108 Caldmore Rd., Walsall WS1 3RB. Tel: 23382.

Engines for Sale at 'Clearout' prices, e.g. Comp. Special £19, Mills 1.3 £19, Frog 100 £19, Nordec ign. £49, Eta '5' £39, Ohlsson 60 £49, Yulon 29 £29, Mechanair £39, Stentor £39, Arden 09 Atwood champ. Delong 30, Forster 99, Hornet 60, Ohlsson 23, Pacemaker 59, K. Vulture, DC Wildcat, Miles Special, Taplin Twin and many more. Please phone or write for list to Mike Clanford, 4B Camborne Rd., Sutton, Surrey. A member of the Model Engine Collectors Association.

WHARFEDALE 1000 SPONSORS

Flying Models (Leeds), Javis Mfg. Co., Morris & Ingram (Badger), Gloy, Solarbo, Smith & Gibbs (SP 311), Humbrol (X-Acto).

THANK YOU

Whether you're a beginner or a hardened enthusiast try us for that elusive item. Model Images Retail, 56 Station Road, Letchworth, Herts. Phone 046 264859.

Gliding

TRY IT FOR REAL

Take your holiday gliding course with the YORKSHIRE GLIDING CLUB. Fully residential Clubhouse with licensed bar, full time professional instructors. Three tugs. Winch. Glassfibre K21 two seaters. Falke motor glider. Hill thermal and wave soaring. Courses April to October. *For details contact*
The Secretary, Yorkshire Gliding Club, Sutton Bank, Thirsk, Yorks. Tel: Thirsk (0845) 597237

J.H.M. PRODUCT UP-DATE

1. Balsa for moulded prop blades. Choice of thicknesses .03", .04", .05" permits optimum 3 laminations in any size prop. Quarter grain. Density marked on each.
2. Tapered rib stock. Thin at l.e. thick at t.e. Stiffer ribs and less need for gussets. Quarter grain. Density marked. Sizes for A/2 and all popular classes.
3. EZB prop blade stock. 4lb "C" grain indoor balsa .015" thick x 1.4" wide.
4. EZB prop spar stock. 8" sheet 5lb blasa 1/16" middle tapering to 1/32" ends. Slice spars to same taper, round corners.
5. Rubber stripping machine. A new concept in strippers at a reasonable price. Turning the handle produces any width of indoor rubber.

SAE for details of those and other exclusive aids for advanced aeromodelling.
J H MAXWELL, 14 Upper Craigs, Stirling FK8 2GD, Scotland.

DAV CAL LTD.
wish to inform of change of address. Now at:
The Loop, Woodbourne Lane, Douglas, Isle of Man. Tel. (0624) 4224

MODEL WORKSHOP
Aircrafts, Boats and Cars
Good supplies of balsa wood, plywood, spruce, mahogany, tissue, rubber etc. Futaba radios and OS engines.
(Help and Advice)
31 Kneesworth St., Royston, Herts. Tel: (0763) 45375

Wanted

WANTED
to complete my British Diesel collection — I need the following engines . . .
E-P-Moth, Majesco Mite, Rawlings 3c.c., Leesel 2c.c., Clan-9, Hallam 2.5c.c., Any Western, Raylight Rapier 3c.c., Kemp 8c.c. twin — will pay up to £200 per engine — will also buy incomplete examples. Have very rare petrol and diesel motors for swops.
Tel: (0634) 408268 (daytime) or (0634) 719011 (evenings) or write to:
PAUL ROSSITER, 112 Watling Street, Strood, Kent.

Wanted Amco .87 'K' and Yulon engines for cash. Obtain my offer last. Steve, 29 Oakfield Street, Lincoln.

Wanted — Ready-built model aircraft, boats, yachts, cars, steam-driven models, also engines, kits, radio control equipment etc. If you are selling up, Tel: Godalming 21425. T/C

Allbon Engines for historic display. Condition unimportant, anything regarding Alan Allbon is of interest. Allbon-Saunders Ltd., Pembroke Lane, Milton Abingdon, Oxon. 0235 831343. HIJ

Books & Publications

AMERICAN AERO-MODELLING MAGS

R/C Modeller prices inc. postage	£2.90
M.A.N.	£2.20
Flying Models	£1.65
Scale R/C Modeller	£2.60
Model Builder	£2.40

Current . . . and some back issues available
THE AVIATION BOOKSHOP
656 Holloway Road, London N19 3PD

Do you have a crafty family? Then they need Popular Crafts Guide to Good Craft Suppliers. This definitive guide for the crafts person has 192 pages packed with information listing Craft Suppliers, Wholesalers, Associations, Courses, Craft Fair Organisers — all cross referenced to enable you to find the information you need quickly and easily. Price £1.95 from your craft shop or bookseller or £2.50 including postage and packing direct from Argus Books, Wolsey House, Wolsey Road, Hemel Hempstead, Herts. HP2 4SS. T/C

'Sailplane and Gliding' — the only authoritative British magazine devoted solely to the sport of gliding and soaring. 48 pages of fascinating material and pictures. Published every other month. Send £8.15 ($17.00) for a year's subscription to British Gliding Association, Kimberley House, Vaughan Way, Leicester, England. T/C

Soft toy collection — full size patterns and complete instructions for making 8 soft toys — it's so easy to follow the clear step-by-step instructions, backed up with hints and tips on all aspects of soft toy-making — including that all important one of how to make money from this enjoyable craft. Price £1.95 plus 25p postage from Popular Crafts, Wolsey House, Wolsey Road, Hemel Hempstead, HP2 4SS. ALT-T/C

Hang Gliding

WELSH HANG GLIDING CENTRE

Details of our hang gliding courses are available by writing or telephoning to:

Dept AM, The Ranch, Crickhowell Riding Stables, Llangattock, Powys, S. Wales.

TEL: (0873) 810019 (24 hours)

General

INDOOR/FREE FLIGHT SUPPLIES
NEW 43 page 'RED' catalogue now available FREE with long S.A.E.
SAMS, 2 THE DRIVE, BLACKMORE END, WHEATHAMPSTEAD, HERTS. TEL: (0438) 832011

Crowborough Models, 2 St. John's Road, Crowborough, Sussex. Tel: (089-26) 4951. All your aeromodelling needs — kits, motors, accessories, radio etc. HIJ

Now you've built a model
Why not build a full size aeroplane? Join the Popular Amateur Aircraft industry with the **Popular Flying Association** and learn how to build your own flying machine. Send 75p for information pack.
POPULAR FLYING ASSOCIATION Terminal Building, Shoreham Airport, Shoreham by Sea, Sussex, England.
Tel. Shoreham by Sea 61616

ADVERTISERS INDEX

AERO MODELLER PLANS SERVICE
Free Flight Scale

S.E.5a *by J. D. McHard.* Famous WW1 fighter in full detail on specially printed plan with photo illustrations and instructions. Fine and tough performer. Span 27 in. (686mm). Also for R/C. Uses 0.5-0.8 cc motors.
FSP/682 **Price £2.75**

PZL WILGA 35 *by P. Hayward.* Very stable 1/12th version of the Polish glider tug, this 36 in. (914 mm) span model's high wing and large tail is an ideal Free-Flight layout. Uses 0.5-0.8cc engines.
FSP/1178 **Price £2.75**

SOPWITH TABLOID *by K. McDonough.* A diminutive 1/12th model, span 25½ in. (648mm). For .3 to .8 cc motors.
FSP/810
Price £3.25

SOPWITH CAMEL
by D. M. Collin
Fine flying, 28 in. (711mm) span version of the WW1 favourite. This 1/12th scale, free flight model is designed for 0.5-0.8 cc engines.
FSP/1143 **Price £1.65**

HANDLEY PAGE H.P.42 *by Cpl. S. Newton.* The famous *Hannibal* airliner. Very detailed drawing for this 65 in. (1651mm) span model uses two 0.8-1cc engines.
FSP/615 **Price £4.35**

D.H. TIGER MOTH *by A/M Staff.* A magnificent 44 in. (1118 mm) span model of one of the best-known aircraft ever. Flies well and realistically. 1/8th scale. For 1-1.5 cc engines.
FSP/555 **Price £3.95**

BLACKBURN 1912 MONOPLANE *by A. M. Finucane.* 1/8th scale, 48 in. (1219mm) span, pioneer monoplane; flies as well as its modern counterparts with 0.8-1 cc motor.
FSP/567 **Price £3.95**

BRISTOL BULLDOG *by P. J. Allnutt.* A 1/12th scale model which uses some spruce and ply in its rib for rib, stringer for stringer construction. Full colourings and markings. Canadian competition winner. Span 33¾ in. (857mm). Engines 1-1.5 cc.
FSP/762 **Price £3.25**

JODEL D9-BEBE *by Hoh Fang-Chiun*
Neat replica of famous French light plane with fixed rudder. Detachable 38½ in. (978mm) span wing, super flyer. 0.5-0.8 cc motors.
FSP/591 **Price £2.10**

SUPERMARINE SPARROW *by G. F. Elsegood.* 1/12th scale of 1920's light racing aircraft designed by R. J. Mitchell; 34 in. (864mm) span model features scale rib spacing and pendulum rudder/aileron controls. For 0.3-0.5 cc motors.
FSP/1408 **Price £1.65**

COLONIAL SKIMMER *by E. Fearnley.* For flying scale enthusiasts who want something different. Span 47 in. (1194mm); for 0.75-1 cc engines.
MA/250 **Price £2.75**

B.E.2e *by K. McDonough.* Lightweight and with large wing area, this 1/12th scale 40¾ in. (1035mm) model flies slowly. Detailed plan includes gun and cameral Power with 0.8-1cc motor.
FSP/721 **Price £3.95**

SOPWITH SWALLOW *by John Darnell.* A 1/8th scale version of a little-known 1918 lighter. Span 41 in. (1041mm), it is fine for the beginner scale enthusiast.
FSP/625 **Price £3.25**

D.H. 80A PUSS MOTH *by J. M. Greenland*
An accurate replica with a scale area tailplane. Excellent performance. Span 30 in. (762mm).
FSR/256 **Price £2.10**

D.H. TIGER MOTH *by C. R. Moore.* The famous Tiggie spans 44 in. (1118mm) and is capable of a high performance. The most popular rubber driven scale model in our range.
FSR/197 **Price £3.25**

FAIRCHILD ARGUS *by E. J. Riding*
Authentic appearance makes this a winner. Span 37 in (940mm).
FSR/272 **Price £2.75**

CESSNA 172 *By W. P. Holland*
This 72in. (1829mm) 1/6th scale model of the popular American light-plane is the answer to those who want an easy-to-build large model for radio conversion. Knock-off wings and shock absorbing trike u/c. For 2.5-3.5cc engines.
FSP/688 **Price £3.95**

CURTISS-WRIGHT JUNIOR
By J. Headley
Free-flight scale model of an unusual subject. Very stable, powered by .5-1cc engines. 48in. (1219mm) span.
FSP/1043 **Price £3.25**

P-51D MUSTANG
by C. Chapman.
The famous WW2 American fighter at 26 in. (660mm) span is a faultless performer.
FSR/1441 **Price £2.10**

AUSTER A.O.P.9 *By R. G. Moulton*
36in. (914mm) span version with all sheet fuselage and tail assembly simple wings. Flies like the real thing, aerobatics or sport flying with 0.5-0.8cc engines.
FSP/580 **Price £2.75**

D.H. MOTH MINOR *by G. W. Day.*
A handy size, low-wing model, well suited for the beginner. Span 35 in. (889mm).
FSR/168 **Price £2.10**

CESSNA BIRD DOG *By E. Fearnley*
High-wing cabin model of 36in. (914mm) span. Pleasing lines are developed from a simple sheet balsa fuselage construction.
FSP/568 **Price £2.75**

DORNIER 27 *by D. Garrett*
A 27 in. (686mm) span model of modern German light plane. Plans include modifications to take .3-.75 cc engines.
FSR/796 **Price £2.10**

Order from: AEROMODELLER PLANS SERVICE AM/84
Model & Allied Publications P.O. Box 35,
Wolsey House, Hemel Hempstead, Herts. HP2 4SS.

POSTAGE:

Inland —		Overseas —	
Up to £1.35	£40p	Accelerated Surface Post	
From £1.36 to £5.50	50p	Up to £4.00	90p
Over £5.50	65p	£4.01 to £7	£1.05
		Over £7.00	£1.25

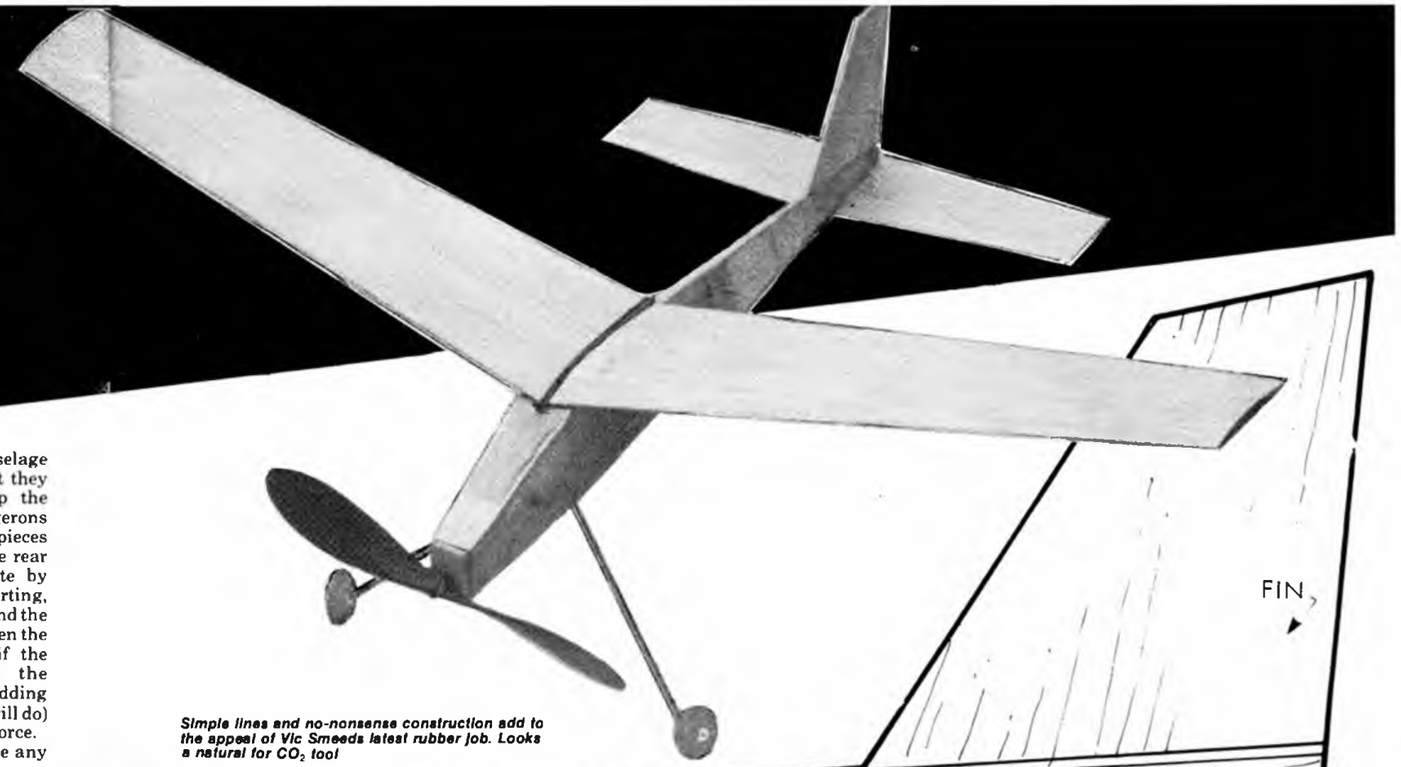
Mini-Minx

Just one sheet of Balsa is all you need for Vic Smeeds fun flyer

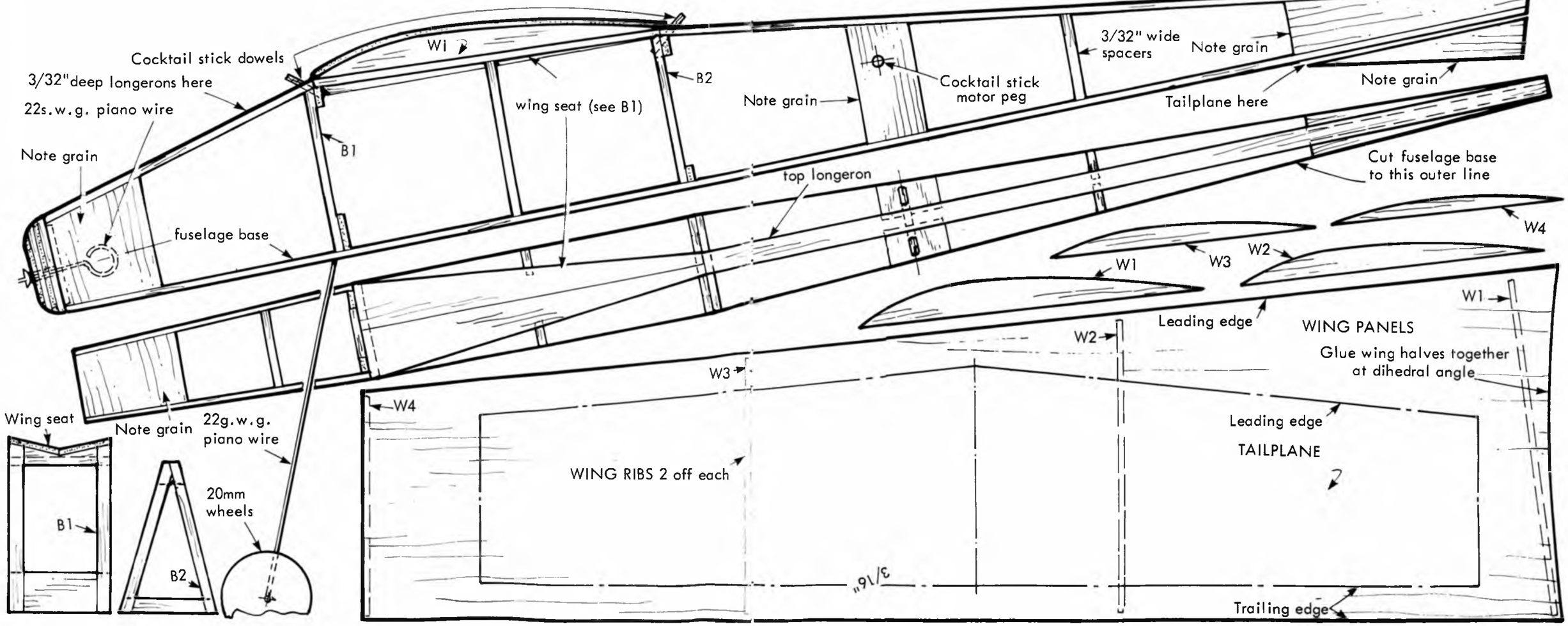
HOW BIG A MODEL can you get out of one stock sheet of balsa? Well, without making a hollow stick fuselage with tissue-covered flying surfaces, this 24 in. design must be close to the ultimate from a single sheet of 1/16 x 4 x 36 in. balsa. Nothing extra was used except wire, a 7 in. plastic prop, celluloid wheels, a scrap of tissue, a cocktail stick and a stub of tube for the shaft bearing. Plus, of course, a small amount of cement, dope, and rubber. Apart from the wing root and ribs, everything is straight lines, making the transfer to balsa simple, since very little tracing need be done; a 12 in. steel rule is really essential for cutting out.

Pick a soft sheet of balsa to keep the weight down and if there is a slightly harder edge, try to arrange to use this for the narrow strips needed for the fuselage. Cut out the wings, tailplane, fuselage bottom and fin; you will probably have to butt join a small triangle to make up the fin. Make up the two fuselage formers B1 and B2 over the drawing, trimming off ends when the cement has set and erect on the fuselage base. Use a matchbox to ensure that they are square and also to square up the nose side panels. Fit the two top longerons at the nose, the wing mount (two pieces angled to the dihedral angle) and the rear top spine and tail panels. Complete by cutting spacers to length and inserting, including the rear rubber anchorage and the top nose panel. The extra spacer between the longerons on top is only needed if the longerons are very soft. Bend the undercarriage and cement in place, adding a patch of tissue (paper hankey type will do) with cement rubbed through, to reinforce.

Lightly sand the fuselage to remove any



Simple lines and no-nonsense construction add to the appeal of Vic Smeeds latest rubber job. Looks a natural for CO_2 too!



APPENDIX: LINKS to the plans

The original issue comes with a free plan (Harrier) printed front/back on a pull out banner of four sheets. The banner is not included in the document.

Mini Minx by Vic Smeed
FF Small Rubber Model
Union Page: 49
Document Page: 10

Harrier by R.A. Williams
CL Profile Trainer for 1.5 engines.
https://outerzone.co.uk/plan_details.asp?ID=9399 ...
Document Page: 24